SEP 2 1927

The

# British Medical Journal

THE JOURNAL OF THE BRITISH MEDICAL ASSOCIATION.

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No. 3476. SATURDAY, AUGUST 20, 1927. Price 1/3


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# A Review OF THE STRUCTURE AND FUNCTION OF THE SPLEEN.*

BY

JOHN TAIT, M.D., D.Sc.EDIN.,

Professor of Physiology and Director of Experimental Medicine, McGill University, Montreal.

I WISH to say what a pleasant thing it is for me to be back in a familiar lecture-room under the presidency of my distinguished chief and teacher of physiology. When in 1899 as a young student I attended the first course of lectures that he gave as professor in Edinburgh—which I still look back upon with delight—he told us, along with other wonderful things, about the known attributes of, and about the perplexities that surround, the function of the spleen. As happened so often in his case, the information he gave was from first-hand knowledge, for he was fresh from an important investigation on the subject, which had taken a winter of work by his pupil Benjamin Moore and himself. That work was fundamental for our knowledge of the muscular and nervous action of the spleen. I wish I could go on to say that there and then I was filled with an eager desire to probe further into the mystery that shrouded splenic function. I cannot speak for my classmates, but certainly nothing was further from *my* thoughts. At the same time, it was of distinct value to have had one's introduction to the spleen from a master who had equal range over the finer structure as displayed by the microscope and over the gross behaviour of the organ as studied under the conditions of instrumental laboratory investigation.

My particular interest in the spleen began accidentally, when Miss Macnaughton (now Mrs. McCartney) and I were engaged in injecting particles of Indian ink into the circulation of mammals, so as to compare with some of the results previously obtained by similar injection into Crustacea. We found that the particles, even when injected in enormous quantity, were speedily swept out of the circulation and deposited in the spleen, in the liver, and in the bone marrow. While the foreign particles slipped past the cells of the vascular endothelium, without any tendency to adhere to them, they had in the liver, spleen, and bone marrow been caught and ingested by special cells that here line the blood channels. In other words, in each of these three organs of the mammal there are naked areas devoid of the normal endothelial lining, and many of the cells situated along these bare areas are phagocytic. We thought for the moment that we had lighted upon a new fact of obvious importance in connexion with blood spread of infections—malaria, typhoid, kala-azar, small-pox, tuberculosis. Our teachers in discussing these diseases had certainly told us little of the extraordinary phagocytic properties of these cells in spleen, liver, and marrow. As so often happens with discoveries so simply and so easily made, other people had been in the field long before us, only their work had been forgotten. We were also unaware that Aschoff had, just before us, seized the great significance of the same facts.

This was in the early days of the war. The next thing was that I found myself out in Macedonia treating malaria patients in the actual country from which we obtained our word spleen, and where, 2,500 years ago, this organ commanded almost as much attention—in connexion both with sacrificial ceremonies on animals and with disease in man—as the brain or the heart does in modern times with us. To the early Greek physicians—and Galen later reflects the same outlook—the curious variations in volume of the malaria-infected spleen possessed an interest that we more fortunately situated people find difficult to understand. So prevalent has malaria long been in Greece that there is reason to believe that this disease, even more than political dissension, proved the ultimate undoing of the country. It was an arresting experience to come back from Greece and from Macedonian "Erlebnisse," and to read the *fons et origo* of medical literature, Hippocrates, where the ravaging story of malaria stands printed on page after page of the most original, the most detached, and objective writing in the whole of medicine. Had we not had unusual medical experience in Macedonia, for which our clinical training, our pathology, had failed to prepare us—cases of black urine, cases of delirium, of coma, bodily disorder protean in variety and baffling as regards both rationale and treatment? And in our ignorance we had imagined that these manifestations of disease were being seen and recorded by us for the first time in history. Some of you may in your childhood's days have landed on some lone deserted island. As flocks of wild birds rise on the approach of your boat you imagine that you are actually a Robinson Crusoe, setting foot for the first time on utterly unknown shores. When you get older you discover that your Crusoe island has a proprietor, has been carefully mapped, measured, and charted, has even had its human population in earlier days, to whom every beach, every curve of the coastline, every jutting rock, was perfectly familiar. So it was on returning from Macedonia to read the story of malaria in Hippocrates.

In the course of this disease Hippocrates finds that the spleen may suddenly enlarge, and within a day or two become again reduced in size. One of his remarks, transmitted by Galen, is, ὅσοις γε τὸ σῶμα θάλλει, τουτοις ὁ σπλὴν φθίνει—that is, when the body flourishes the spleen *wastes*. We examined the children, often anaemic and ill nourished, of the villages near our camp. We found spleens reaching down to or below the level of the umbilicus. In other words, the enlarged spleen represented the normal condition of the Greek child, whence the point of Hippocrates's unusual remark. Could any statement better illustrate the universal prevalence of malaria in his day? Galen informs us that both Hippocrates and Plato considered the spleen as an organ for purifying the blood, an opinion as prophetically consistent with modern findings as are the atoms of Democritus. If we can make one single all-embracing statement about the spleen as it occurs throughout the range of the vertebrates, it is that it purifies or "catharses" the blood.

However, this is not an historical lecture. I have to open a discussion in the year 1927, in the Physiology Section of the British Medical Association, and under the exacting eye of Sir Edward Sharpey-Schafer himself. There are other speakers too—for instance, Professor Barcroft—whose work on splenic function has been so fruitful and so illuminating.

## FUNDAMENTAL FEATURES.

The spleen is essentially a vertebrate organ, and its steady persistence throughout the group is an indication of its importance. Comparative study shows that it has certain common structural features, which we may count fundamental or essential. In some animals—for example, mammals—we find additional structures, notably lymphoid tissue and splenic muscle; these we may regard as secondary acquisitions. Let us devote our attention to the fundamental features, which may be studied to particular advantage in the spleen of the skate.*

### *The Spleen of the Skate.*

This is a tough and freely movable organ, externally quite like the spleen of mammals. It has, however, no lymphoid tissue, no trabeculae, and no special splenic musculature, the only muscle within it being that which invests the arteries. The firmness of the organ is due chiefly to the strong-walled vessels that ramify within it. These provide a tough, stringy foundation, which in turn is embedded in a more deformable, more dilatable reticulum. The fibres of this reticulum, which serves to enmesh all the cellular elements of the parenchyma, are stouter, stronger, and more conspicuous than those met with in any mammalian spleen, yet their strength, as dissection shows, falls far short of that of the ramifying arteries and veins. In other words, so far as mechanical resistance is concerned, the principle of construction in the skate spleen is like

* A paper read in opening a discussion on this subject in the Section of Physiology and Biochemistry at the Annual Meeting of the British Medical Association at Edinburgh. Professor Sir Edward Sharpey-Schafer, M.D., F.R.S., President of the Section, was in the chair.

* The anatomical details here given in regard to the skate spleen have been worked out in conjunction with Dr. E. S. Mills.

that employed in ferro-concrete, where strings or rods of more resistant material greatly augment the strength of the composition. A fibrous capsule surrounds the whole.

### *Development.*

As Laguesse has shown, the spleen of elasmobranchs as well as of other fishes takes origin as a kind of reticulated venous sinus alongside the subintestinal (later the portal) vein, with which it stands in open communication. At an early stage no regular or rapid blood current sets through it, though delicate ramifying sinuses begin to form defined channels for blood eddies. Arteries eventually penetrate from the exterior into this spongy, sinus-provided tissue. When they have worked their way well into the interior their ends become open, and then for the first time arterial blood pours into the reticulum. As might be expected, the strong-walled veins proper of the organ have been taking form and semblance during the time of inroad of the arteries, and now for the first time the natural through-and-through current is established. There are thus two distinct stages in the development of this unique organ, and even after the second stage the circulatory arrangements remain unusual. In the first stage the spleen is a spongy, blood-sodden, yet sinus-provided excrescence on the side of a vein. In the second stage arteries, carrying their muscle coat and their fibrous adventitia with them, shoot in from the exterior. Coincidently, well formed veins, with fibrous tissue wall, reach inwards as a counterpart to these arteries. Though they trend towards each other their terminations never meet by direct inosculation. Everywhere between the ends of the tubular arteries and the stout-walled veins lies a marsh, a morass of reticulum with its runnels, the venous sinuses.

In this description I have closely followed Laguesse. At one point only have I ventured to modify his account. He would have it that the walls of the intrasplenic veins are everywhere formed of compacted reticulum. In point of fact, over a considerable part of their intrasplenic course the walls of the larger veins are composed mainly of tendon-like bundles of wavy, non-branching, white, collagenous fibrils, which may be assumed to have grown in from the adventitia of the parent vein or veins. The spleen of the skate, therefore, consists of arteries which have invaded its texture; of veins, which we may also look upon as having grown in from the exterior; and between these two—what? The original reticulated and sinus-provided sponge which originated in close relation to the subintestinal veins.

### *Arteries and Ellipsoids.*

The arteries eventually terminate in penicillar vessels. Each penicillus gives off near its extremity a small cluster of terminal vessels. Each of these in turn ends in one or more ellipsoids. The ellipsoidal mode of termination of the arteries is a fundamental feature of splenic architecture, and in fishes, just as in mammals, the sessile phagocytic cells of the ellipsoids capture foreign particles introduced into the blood stream and probably also ingest effete corpuscular elements of the blood, this being our modern conception of the "blood-cleansing" process of Hippocrates. It is noteworthy that in the spleen of the skate each terminal vessel comes to a blind end within the ellipsoid. In the mammalian spleen the terminal vessel frequently passes through an ellipsoid and ends beyond it. Whether this peculiarity of the arterial endings in the mammalian spleen is correlated with the presence of the special splenic musculature I am unable to say. The spleen of the skate, which is devoid of muscle, exercises no detectable pumping action, and it is a debatable question whether it acts as a temporary store of erythrocytes as Barcroft has shown the mammalian spleen to do. In texture the ellipsoids resemble those of the mammalian spleen, being composed of very finely meshed reticulum, which is continuous with the general reticulum of the parenchyma.

### *Veins and Venous Sinuses.*

The veins of the skate spleen originate as venous sinuses, this mode of origin being again a fundamental splenic feature. The sinuses have none of the elaborate architecture described by Mollier in the case of the mammalian spleen. They are mere endothelium-lined tunnels in the general reticulum. Although to the eye the lining sheet of endothelium appears continuous, the blood and blood corpuscles can evidently pass freely between the endothelial cells, for nowhere is the uniform continuity of any sinus wall seen to be broken. As in the mammalian spleen, the walled veins do not reach quite so far into the organ as do the arteries, the place of the penicilli being taken by venous sinuses. The disposition of the veins, however, is different from that in the mammalian spleen, in which these vessels are carried by trabeculae. In the spleen of the skate, which is devoid of trabeculae, venous and arterial branches tend to run side by side, being bound together in a common investment of thickened reticulum. Within this common reticular sheath the larger venous branches have a very stout wall composed of bundles of non-branching collagenous fibrils. In possessing a real fibrous tissue wall both the arteries and the veins of the spleen may be regarded as foreign intrusions lying in the midst of the general reticulum. The venous are invariably of wider calibre than the corresponding arterial branches.

### *Fundamental Vascular Features.*

Let us now review the vascular arrangements, confining our attention solely to the fundamental features. Inasmuch as the arteries and veins have a wall containing real fibrous tissue they constitute intrusions into the splenic reticulum. The arteries are a little longer than the veins; at the level at which the arteries ramify into penicilli the veins give place to venous sinuses. The penicilli break into terminal vessels, each associated with one or more ellipsoids, which are composed of finely meshed reticulum. The ellipsoids contain sessile phagocytic cells, which, after ingestion of foreign particles, migrate into the parenchyma. Within an ellipsoid the endothelial lining of the arteries may come to an end. Between the ellipsoids and the venous vessels intervenes the general reticulum of the spleen. The blood passing through this reticulum enters venous sinuses before reaching the veins proper. Notwithstanding the apparent continuity of the lining endothelium of the venous sinuses, their walls are everywhere porous. The venous are of larger calibre than the corresponding arterial branches.

### *The Reticulum.*

The reticulum of the skate spleen is beautifully displayed by the Bielchowsky staining procedure. Fortunately, too, the Bielchowsky method in this case usually makes a distinction in depth of colouring between the true reticular and the non-branching collagenous fibres present in the wall of the veins and arteries and in the external capsule. Thus the limits of the reticulum can be defined, and we shall devote our attention to the problem of assigning its exact boundaries.

Besides the Bielchowsky method of displaying the reticulum there is another equally instructive method, which serves, too, as a valuable check upon the staining procedure. This is to inject backwards through the main splenic vein a suspension of Indian ink particles, followed by a similar injection of formalin. The latter material, clearing the ink out of the veins and venous sinuses, drives the last of it into the reticulum, which the reagent also fixes—and here I might say that, whatever its disabilities for fixing cells, in its application both to reticular and to white connective tissue fibres, formalin for special reasons stands supreme as a fixing agent. The particles of ink find their way to every available part of the reticulated interior, and as the reticular fibres have as strong a molecular attraction for these particles as the strands of a cobweb have for dust, our microscopic section after this form of treatment shows practically the full extent of the ink-laden cobweb of reticulum. Instead of dyeing or staining, we have here succeeded in painting the reticular fibres, which is a rather unusual histological procedure. There is one exceptional region. The ink does not gain entry to the ellipsoids, which therefore remain unpainted. To coat the reticular fibres of these structures we must inject the pigment, not by way of the veins, but by way of the arteries. By what means this sharp barrier is maintained at the surface of the ellipsoids is hard to explain.

*The Reticular Boundaries.*

Let us now consider the real reticular boundaries. When we remember that over and above the fibrous capsule, on which the reticulum must of necessity demarch, there are only two major intrusions into the tissue—namely, the arteries and veins—it is plain that the ultimate boundaries of the reticulum are either capsular or vascular. Suppose we examine the reticulum where it encounters one of the larger arteries or veins. As they come progressively within the sphere of influence of these structures the interlacing reticular fibres uniformly and rapidly increase in thickness. While the fibres thus enlarge their meshes rapidly become smaller, until finally, in contact with the true fibrous material that forms the outer wall of the vessels, the stout reticular fibres have plaited themselves into a close basketwork, in which chinks and interstices are virtually eliminated. Up to a certain point the ink can penetrate between, and settle upon the withies of this basketwork, but its further progress seems to be barred by the mere compaction of the reticular material, and just beyond this boundary line lies the true fibrous wall of the vessel. Similar matted condensations of the reticulum may be found at many regions under the capsule, and were this heavy compaction of stout-fibred reticulum present at every part of the boundary surface we might have concluded that the fibrous tissue was separated from the reticulum solely by an intimate intertwisting of thickened reticular fibres. In many places, however, particularly round the penicillar and terminal vessels, but also under the capsule, the reticulum that abuts upon the non-reticular tissue is no more condensed than that surrounding the ellipsoids. Yet the demarcation between the vessels or capsule, as the case may be, and the reticulum is perfectly sharp. Where anchoring strands of reticulum pass radially to the vessels, or normally to the capsule, the various bays or bights between the anchoring fibres are seen to be fringed with black. In other words, a thin but complete screen of reticulum closes off the capsule and the intrusive vessels from contact with the splenic blood.

*Two Modes of Arrest of Haemorrhage from an Artery.*

In order to appreciate the significance of this arrangement let me digress for a moment to consider an experiment which is easily carried out, though I have not seen it described. Suppose the carotid artery of a dog has been laid bare with the intention of observing the method of arrest of haemorrhage when the vessel is punctured. If the adventitia is removed before puncturing the artery, the blood sprays out for a very long time. When the haemorrhage eventually ceases the wound is seen to be plugged with a platelet thrombus. Coagulation plays no part here in stopping the bleeding. If, on the other hand, the intact vessel is punctured, the course of events is totally different. No external bleeding occurs. The blood simply enters the meshes of the adventitia, which it distends like a sausage. The bleeding is very soon over. No plug of platelets has this time formed in the orifice in the media. Arrest is due to the prompt coagulation of the blood in the adventitia. The same experiment may be carried out on the aorta of a skate. If the adventitia has been previously removed, the wound is eventually plugged by agglutination of the nucleated spindle cells. If the vessel is punctured through the adventitia, prompt coagulation occurs, which leads to rapid arrest of haemorrhage.

*Haemothigmic and Anaemothigmic Tissues.*

This experiment teaches us that in contact with the fibres of ordinary connective tissue blood undergoes a change, being inevitably induced to coagulate. We know that the blood may come freely in contact with reticulum without being induced to clot. In its negative action upon the blood, reticulum, like ordinary endothelium, may be termed *haemothigmic*—that is to say, these tissues may freely touch blood. By contrast with these haemothigmic structures probably the great mass of the other tissues of the body, and certainly ordinary connective tissue, are *anaemothigmic;* these may not touch blood. In the spleen the anaemothigmic structures—namely, the capsule, the blood vessels, the Malpighian corpuscles, which lie in the adventitial sheaths of the arteries, and the trabeculae—are screened off by means of haemothigmic reticulum from the reticular interior.

*Continuity of Reticular and White Fibres.*

A striking fact is that the reticular fibres are structurally continuous with the fibrillar bundles of collagenous material that form the capsule and the true sheaths of the vessels. For a time I was inclined to think that the distinction between the two kinds of fibres, the anastomosing reticular and the non-branching "areolar," is absolute. Our president, Sir Edward Sharpey-Schafer, had observed in lymphatic glands complete structural continuity of the two kinds. It was difficult at first to confirm this in the skate, but renewed examination eventually showed that the larger reticular fibres around the vessels and under the capsule directly and abruptly change into fibrillar bundles of the ordinary white connective tissue type. This is not the place to enter into a discussion as to the possibility of an ultimate chemical separation between the two kinds of material. Hitherto no satisfactory chemical differentiation has been made, and Mallory has recently shown that the supposedly specific reticular stains fail to differentiate between reticulum and ordinary connective tissue fibres. Suffice it to say that there is a difference of a physico-chemical kind, which, involving the surface properties of the fibres, may well lie at the root of their ultimate divergence in features of structural character.

*Junction of Endothelium with Reticulum.*

Our survey of frontiers is not yet wholly complete, and the "boundary commission" into which this meeting has temporarily constituted itself has still two thorny problems before it. These, being questions of "corridors" and seaports rather than of land frontiers, are of very particular delicacy, and before concluding we must have some decision, however provisional, regarding these critical regions. The blood is conveyed to the spleen in a conduit of endothelium. It leaves the spleen by a similar conduit. The arterial endothelium creeps inwards to a certain distance and then stops. The venous endothelium of the organ, derived from the parent stock of endothelium that lines the chief veins, likewise creeps inwards as far as it may. Between these two conduits of haemothigmic endothelium intervenes the whole irregular sponge of haemothigmic reticulum. How is junction of endothelium with reticulum effected at the two terminal stations respectively?

I have said that the substance of the ellipsoids consists of very finely meshed reticulum. Their central cavity is lined with endothelium. The junctional station in this case is therefore to be sought in the interior of the ellipsoid, and just at the place where the endothelium rests upon the finely meshed reticulum. Although to the eye this endothelium appears to form a complete lining to the central cavity, we know that the blood can pour between its constituent cells. May it be that endothelial cells, possessed of bipolarity as we know them to be, and resting upon a haemothigmic instead of an anaemothigmic tissue, have difficulty in obtaining a proper base or foundation for their attached face? Some such supposition as this is rendered the more likely when we turn from the ellipsoids to consider the venous sinuses, which are also endothelium-lined. In the spleen of the skate these sinuses can be closely studied. They consist of nothing but tubes of endothelium surrounded by the simplest possible reticulum. So far as any special modification of the arrangement of the investing reticulum goes, the venous sinuses might simply have been punched out of the general reticulum with a sharp cheeseborer. Yet when the inner sinus-directed surface of the reticulum encompassing each sinus is examined with a high power innumerable fine brushes of freely ending reticular fibres are found projecting towards the endothelium, which in turn appears in section to form a complete lining to the sinus. Now we know that blood can pour as easily through the wall of these sinuses as through a sieve. The apparent continuity of the lining endothelium is wholly deceiving, and we connect the anomaly of the porosity of the lining with the intrinsic difficulty of attaching endothelial cells to reticular fibres. They are here cemented, not to the haemo-

thigmic sides of the fibres, but to the delicate truncated or amputated ends of the microscopic brushes, which alone can obtain a grip on these pavement cells. This at least is my interpretation, conjectural, but I hope reasonable, of what I see.

### CONCLUSION.

In the survey I have elected to deal with one single aspect of the spleen problem. It is true that members of my laboratory in McGill University—Dr. M. F. Cashin, Dr. E. S. Mills, Dr. J. G. P. Cleland—have recently been publishing or participating in publishing certain novel findings with regard to the spleen, but as these are already available in printed form I thought it better to branch away from the details of their work and to attempt to express some general ideas which emerge in considering the peculiar architecture of the organ. There has been no time as yet to put these views, in so far as they are hypothetical, to direct experimental test, or otherwise to develop experimentally any of the further issues that forthwith present themselves.

In view of the increased interest in reticular tissue since the introduction by Aschoff of the term "reticulo-endothelial system," may I be permitted to say that, important as the conception of this system is, the name that Aschoff choose for it is rather apt to mislead, for the reticulo-endothelial system is essentially devoid of any endothelium. In view also of a common misconception attaching to the name, it is well to remember that reticulum occurs in many places to which the corpusculate fluids, blood and lymph, have no access; in other words, the presence of reticulum in an organ does not mean that the organ constitutes part of the reticulo-endothelial system. It is true that reticulum, at least as we find it in spleen, bone marrow, and lymph glands, is haemothigmic; but this may be a mere accident of its constitution, in the same sense as one might say that the excitability of nerve fibres to an external stimulus applied anywhere along their length is a fortuitous rather than a necessary feature of their organization. Should inquiry be made as to the primary function of reticulum as compared, say, with areolar tissue, I should like to make one significant observation. When we examine the various localities in which areolar tissue occurs—for example, between muscle fibres or tendon bundles, under the skin, around nerves, blood vessels, etc. —we find that they are all places where shearing or sliding movements occur. Such movements of slip also occur between serous membranes and in synovial joints. The shearing movements that occur where areolar tissue is found are, however, subject to definite limitation. It is the inextensible white fibres of the tissue that impose a limit on the amount of shearing displacement, the elastic fibres serving the purpose of restoring the structures to the neutral position. Now reticulum constitutes the connective tissue framework of solid glands, such as the kidney liver, or spleen, where shearing displacements as such are not called for, but where uniform expansile movements must be provided for. According to this conception the primary purpose of reticulum is a mechanical one; its haemothigmic properties are secondary.

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### DISCUSSION.

Professor J. BARCROFT (Cambridge) reviewed the relation between the nervous system and the vascular function of the spleen. Using the preparation in which by a surgical operation the spleen could be placed outside instead of inside the dog's body, it had been shown that during muscular exercise the discharge of the spleen was controlled by the nervous system. The spleen anticipated exercise, and even expelled its blood into the general circulation when activated by jealousy or anger. In the case of a jealous animal, the spleen of which had been made to grow outside it like a mushroom, the organ might be seen to grow pale when the animal's rival was fondled. Was this pallor specific to the spleen, or did it affect the whole alimentary tract? The spleen circulated the blood in its pulp: this also seemed to be ruled by the nervous system, for it did not occur in denervated portions of the spleen. The function of the rhythmic contractions of the spleen might be the production of this concentration.

Professor P. T. HERRING (St. Andrews) pointed out the necessity of considering the allied glands, especially haemo-lymph glands, in investigating the functions of the spleen. He considered the circulation of blood through a lymph gland and mentioned that cells could be taken up from the circulation and held by the reticular cells. These cells became detached and migrated to the centre of the nodule. It was considered that attention should be paid to this aspect in relation to the lymphoid tissue of the spleen.

Sir HUMPHRY ROLLESTON (Cambridge) asked for further information about the data for the existence of two methods of circulation of blood through the spleen—one, perhaps, through the subcapsular area, the blood rapidly leaving the organ, the other of the storage nature, in which the blood remained there until it was wanted. He added that it would be interesting to know about the influence, inhibitory or otherwise, of the spleen on the bone marrow. How far had the spleen any special influence on immunity? Secondary as well as primary growths were very rare in the spleen; the rarity of secondary growths was perhaps partly due to the infection cells being drawn on into the liver; or was there some further power of resisting neoplasm in the spleen?

Dr. H. C. HOU (Pekin) reviewed the experimental work in progress in Pekin. The spleen was attached to the body wall and divided into halves. The upper portion had an intact nerve and blood supply while the lower half was denervated. A marked reduction in the size of both portions was observed after exercise, the diminution being more pronounced in the denervated segment. It was suggested that this was due to the liberation of adrenaline, as no change had been found in animals where both adrenal bodies had been removed. Spleens of doubly adrenalectomized dogs only contracted to a slight extent after death, while a marked reduction was found in the normal dog. Injections of adrenaline and pituitrin caused diminution in the size of the spleen.

Sir EDWARD SHARPEY-SCHAFER (Edinburgh) described experiments proving that the spleen was an organ most sensitive to adrenaline.

Sir BERKELEY MOYNIHAN (Leeds) remarked that recent investigations by the physiologists had borne out the anticipations of older writers. Pliny had stated that the spleen was enlarged in those who exhibited "immoderate laughter," and Maria in *Twelfth Night*, calling Sir Toby Belch when she was twitting Malvolio, refers to the same function. In *King John* the Bastard spoke of "spleen of speed to serve Your Majesty." Physiology had been termed a "laggard science." The surgeon ardently seeking for knowledge of many of the functions of the spleen turned almost in vain to the physiologists for answer to such questions as why all the splenic blood passed through the liver; why the veins from the tail of the pancreas carrying blood from the islands of Langerhans conveyed more blood than from the larger end of the gland; and why the blood from the large intestine joined the splenic vein before the blood from the small intestine. In connexion with splenic anaemia, many problems needed consideration and answer. The surgeon had shown, by his operations for haemolytic jaundice, one of the functions of the spleen. Sir Berkeley urged that physiologists should make their observations not only upon cats and dogs and mice, but upon men. Their work should be not only in the laboratory, but side by side with physicians and surgeons in the wards and in operating theatres. They would so give a purposeful direction to investigation and fill many gaps in the knowledge of functional anatomy.

Professor TAIT, in his reply, said that lymphoid tissue was not an essential element in the structure of the spleen. At the same time the circulatory and phagocytic arrangements present in the spleen showed a remarkable similarity to those adduced by Professor Herring as occurring in lymph glands. In the ellipsoids the blood first came into contact with reticulum, and foreign particles tended to adhere to the reticular fibres of these ellipsoids.

These particles were now collected and ingested by the sessile phagocytes of the ellipsoids, which thereafter migrated into the splenic parenchyma, just as the phagocytes of the lymphatic glands travelled when the empty ellipsoids underwent a regenerative process accompanied by hypertrophy. As Dr. E. S. Mills had shown, this process might lie at the root of splenomegaly. In answer to a criticism by Sir Almroth Wright, who objected to a division of the tissues into haemothigmic and anaemothigmic, on the ground that the blood coagulating principles were soluble rather than cellular, he stated that no tissue extract was active unless it contained cellular debris. He referred to recent work by Dr. Cleland and himself on the nervous machinery controlling rhythmic contraction.

## THE KINETICS OF THE VARIOUS HAEMOLYTIC SYSTEMS.*

BY

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THE object of an opening paper should admittedly be to arrange and to condense the subject so that it can be easily grasped even by those who are unfamiliar with it. In the case of the subject of haemolysis, with its many and diverse investigations, this is impossible; I propose, therefore, to fix at the very beginning the point upon which all these investigations must ultimately converge, and to deal with the subject by describing certain successive steps which lead up to the final problems; for the solution of these final problems, concerned as they are with the reactions occurring in complement-amboceptor systems, forms the principal justification for the labour spent on the study of simpler haemolytic phenomena. This treatment can only result in the presentation of the subject from a restricted point of view; it will, however, make the connexion between the simple and the complex forms of haemolysis as plain as is possible.

Before considering the action of even the simplest haemolysin it will be as well to be quite clear about the structure of the cell upon which it acts. All the recent investigations lead us to the conclusion that the red cell of mammals is a balloon-like structure possessed of an envelope of considerable strength. One of the clearest proofs of this is the fact that the changes of shape and size which the cell undergoes, both in hypotonic solutions and in solutions containing haemolysins, are those of a balloon-like body and not those of a sponge-like structure;[1] if more direct evidence is required, Seifriz[2] has actually microdissected the human red cell, stretched its envelope, and observed the escape of fluid containing haemoglobin. There is considerable evidence, from investigations on quite different lines, that the envelope is composed principally of protein and not of lipoid, as was once thought; in this connexion may be mentioned the work of Oliver and Barnard[3] on cell agglutination, of Seifriz on microdissection, as well as the results of the recent work on the haemolysins. The best conception of the structure of the envelope is probably one similar to Bechold's—a protein framework, in the interstices of which lipoid is contained. Several proteins probably enter into the composition of the framework.

The action of the haemolysins must therefore be principally on this complex envelope, its continuity being destroyed, with the result that the fluid contents are liberated into the surrounding fluid.

### 1. *Simple Haemolytic Systems.*

Setting aside the instances of lysis by mechanical means, which tell us very little, the simplest cases of haemolysis are to be found in systems which contain one lysin of known constitution and in known quantity, acting on washed red cells, and acting in the absence of any substances which accelerate or inhibit the reaction. As an example we may take the case of saponin acting on washed mammalian red cells at a constant temperature.

In such a case it is easy to satisfy oneself that the reaction which results in lysis is accompanied by a using up of saponin, and by a combination of the lysin with some component of the red cell envelope. This component is certainly protein in nature. The amount of saponin used up in producing lysis of any given number of cells can be very exactly measured, and the rate at which the using up proceeds gives us the rate of the reaction between the lysin and the protein component of the envelope with which it combines. This reaction we call the "fundamental" reaction. The factors upon which its velocity depends have been exactly determined, and it is known that the amount of saponin, $x$, used in producing lysis in time $t$, is given by the expression (1):

$$\kappa t = \log \frac{c}{c - x}$$

where $c$ is the initial concentration of saponin present in the system, and where $\kappa$ is a constant which varies with the surface presented by the cells, the temperature, and other factors. The fundamental reaction, which is described by this expression with great accuracy, is therefore a reaction of the first order, and its velocity at any moment dependent on the concentration of free lysin present at that moment.

Expression (1) thus gives the quantity of saponin combined with the cells at the end of any given time, but it does not, as it stands, give the amount of lysis which results from this combination. The reason for this is that the cells offer different resistances to the lysin, so that the least resistant cells haemolyse when only a small amount of their protein component is united with the saponin, whereas the more resistant cells require large quantities of the protein component to unite with the lysin before haemolysis takes place. On theoretical grounds we should expect that the cells, if grouped according to their resistance, would give a frequency distribution of a symmetrical type, the resistance of a few cells being small, the resistance of a few cells being great, and the resistance of the majority being intermediate. This is in fact the case, and the particular distribution, for human cells at least, is of the type shown in expression (2):

$$n = y_0 \left(1 - \frac{x}{a}\right)^m$$

Here $n$ is the number of cells, expressed as a percentage of the whole for convenience, in any group of resistance $x$; $y_0$ is the number of cells of mean resistance, and $a$ and $m$ are constants.

Now as the fundamental reaction proceeds according to expression (1), quantities of lysin $x_1$, $x_2$, $x_3$, etc., combine with the cells in times $t_1$, $t_2$ $t_3$, etc. The cells whose resistance corresponds to $x_1$ haemolyse when $x_1$ is formed, and, if we want to determine their number, we can do so by means of expression (2). When $x_2$ is formed, the cells whose resistance corresponds to $x_2$ haemolyse; this number is again given by expression (2). And so on for $x_3$, and for all other values of $x$. The number of cells which are haemolysed at any moment from the beginning of the reaction until the stage of complete haemolysis is accordingly not to be found from any one expression, but from the simultaneous solution of expressions (1) and (2).

The result of this simultaneous solution is an S-shaped curve which gives the number of cells haemolysed at any stage of the experiment, and, as the fundamental reaction is steadily slowing down, the S-shaped curve is always asymmetrical. Recently several methods have been introduced for the study of such curves, by far the best being that which depends on the use of selenium as a means of measuring the intensity of the light transmitted by the cell suspension. By this method, which we owe to Mellanby, it can be shown that the S-shaped curves obtained from experiment agree exactly with those calculated from expressions of the form of expressions (1) and (2).[4] The conclusion must be that the fundamental reaction between the protein of the envelope and the lysin is of the first order, and that the resistances of the cells is expressed by a frequency distribution of Pearson's Type II. That some explanation such as this is the probable one was suggested by Brooks[5] in a theoretical

* A paper read in opening a discussion on haemolysis in the Section of Physiology and Biochemistry at the Annual Meeting of the British Medical Association, Edinburgh, 1927. Sir Edward Sharpey-Schafer, M.D., F.R.S., President of the Section, was in the chair.

paper of outstanding importance some six years ago; all the investigations since that time, both theoretical and experimental, have placed this hypothesis in an unassailable position.

From the foregoing we should expect there to be a relation between the quantity of protein in any particular type of red cell and the resistance of that cell to saponin. This relation certainly exists, for if we arrange the cells of different species in order of their resistance to saponin, we find them arranged very nearly in order of their protein content. Unfortunately for simplicity, however, this relation does not appear to hold for other haemolysins. Kofler and Lazar[6] have shown that the protein content does not determine the resistance to digitonin, senegin, and other glucosides, and McLachlan and I have shown the same absence of the relation in the case of the haemolysins of bacterial origin.[7] Such observations certainly give rise to some little difficulty, but it is to be remembered that the affinity of the protein of the cell for the lysin, as well as the absolute amount of the protein in the cell, has to be taken into account. In the case of saponin, the affinities of the proteins of the cells of the ox, sheep, rabbit, etc., for the lysins are much the same, with the result that the absolute quantity of the protein is the only factor influencing the resistance; in the case of other lysins the affinities may be quite different, perhaps owing to slight differences in grouping within the protein molecule, and thus the effect of the absolute quantity of protein present in the cell envelope may well become of secondary importance. The matter can be decided by a careful evaluation of the constant $\kappa$ in expression (1), but this is a matter of great difficulty.

By methods identical with those used for the investigation of the haemolytic properties of saponin it can be shown that sodium taurocholate, and also sodium glycocholate in certain concentrations, form compounds with the proteins of the cell envelope; the process of formation of this compound is, as in the case of saponin, a reaction of the first order, and is described by an expression of the form of expression (1). The complete solution of the kinetics of the haemolytic reaction involves two expressions just as in the case of saponin, the first relating to the velocity of the fundamental reaction, and the second giving the distribution of the cell resistances. The frequently made statement that the bile salts act as solvents of the lipoids of the red cell envelope and thus produce lysis will not bear even the most superficial examination; it is, for example, quite incompatible with the fact that sodium glycocholate in concentrations of about 1 in 100 is much less haemolytic than the same salt in concentrations of 1 in 1,000.

To the substances which fall into this simplest class of haemolysins may be added most of the haemolytic glucosides (digitonin, senegin, smilacin, sapotoxin, helleborin, etc.), the soaps,[8] and the salts and acids allied to the bile salts. Each of these substances forms loose compounds with protein, and each, when studied quantitatively, will be found to follow the same laws as have been shown to hold for saponin. Sodium glycocholate alone presents peculiarities. Within the last few months McLachlan and I have been able to show that most of the lysins of bacterial origin fall into this class, for the haemolytic substances produced by *B. welchii*, *B. anthracoides*, *B. tetani*, *B. histolyticus*, *B. subtilis*, *B. coli*, *El Tor vibrio*, *Streptococcus pyogenes*, and *Staphylococcus pyogenes*, all act in a manner similar to saponin, and conform to the same quantitative laws. It is of interest to note that two of these lysins—that of *B. histolyticus* and that of *Streptococcus pyogenes*—are definitely known to be proteolytic.

### 2. *Inhibition by Serum.*

Since, in the case of all the lysins of the saponin class, the reaction which results in haemolysis appears to be one between the lysin and the protein of the cell envelope, we should expect these lysins to unite with other proteins to form non-haemolytic compounds. This can be readily shown to occur, for, if small quantities of serum or plasma are added to the haemolytic systems, inhibition of haemolysis results. This inhibition was first shown by Bayer[9] to be dependent on the presence of serum proteins, although previously it was believed that it was due to the presence of lecithin or cholesterol. Bayer's observations have been repeatedly confirmed. Recently it has become possible to measure the amount of the lysin which unites with these proteins, and the results indicate that the combination takes place according to the formula applicable to adsorption processes[10]; we therefore conclude that the lysins of the saponin type, which are all surface active, form with the proteins of serum and plasma non-haemolytic adsorption compounds, as the result of which lysin is removed from the system, so that an inhibition of haemolysis results. These observations have been confirmed by Kennedy[11] and by Donnelly and Graeme Mitchell[12]; they are in themselves interesting examples of adsorption occurring in colloidal systems, and their full significance from the point of view of haemolytic reactions will appear when we consider the more complex systems. In the case of sodium taurocholate and of the soaps, the non-haemolytic substance which is formed can actually be seen as a fine opalescence which appears on the addition of the serum.

### 3. *Cell-Serum-Lysin and Cell-Lysin-Serum Systems.*

We have now to consider one respect in which haemolytic systems containing sodium taurocholate, sodium glycocholate, or certain of the soaps, differ from systems containing saponin, the glucosides, or the bacterial haemolysins. The serum proteins always inhibit the action of saponin, owing to the formation of a non-haemolytic compound as the result of a combination between the lysin and the proteins; the serum proteins may, on the other hand, either inhibit or accelerate the action of the bile salts, according to the order in which the components of the haemolytic system are mixed together.[13] As an example, let us take 1 c.cm. of a suspension of washed cells and add first 0.1 c.cm. of serum; one minute afterwards we add 1 c.cm. of 1 in 3,000 sodium taurocholate. The result is an inhibition of lysis by the serum. Now we reverse the process, adding to the same quantity of cells the same quantity of lysin, and adding after the same interval of time 0.1 c.cm. of serum; the components of the system are exactly the same, but the result is not an inhibition, but almost immediate lysis. We have here the interesting case of haemolysis depending not only on the components of the system, but on the order in which these components are brought together. This occurrence introduces into the investigations quite a new type of complexity, and since the two systems which give diametrically opposed results are made up of the same substances in exactly the same quantities, the only way to distinguish between them is to draw attention to the order of the additions, calling the first system, in which there is inhibition, a cell-serum-lysin system, and the second, in which there is acceleration of haemolysis, a cell-lysin-serum system. The order in which the components are written thus indicates the order of addition which is necessary.

The inhibition is easy to explain, for it occurs for the same reason as in cell-saponin-serum systems in which the order of addition is immaterial; the proteins of the serum unite with the lysin to form a non-haemolytic compound, and by the formation of this lysin is removed. The explanation of the acceleration, on the other hand, constitutes a most formidable problem, and, indeed, would probably be impossible to obtain were it not for the fact that an almost identical occurrence takes place in systems in which the lysin is one of the haemolytic dyes. To the consideration of these systems we therefore pass.

### 4. *The Haemolytic Dyes.*

Browning and Mackie in 1914,[14] and Mackie in 1919,[15] have described a curious phenomenon occurring in systems containing brilliant green, and to a less extent in systems containing other dyes of the triphenyl-methane group. Brilliant green is itself a haemolysin, but only in high concentrations; in lower concentrations it acts by "sensitizing" the cells, so that the subsequent addition of small quantities of serum produces rapid lysis. The "sensitization" is carried out by mixing washed cells with a dilution of brilliant green of about 1 in 50,000. The mixture is allowed to stand for a short time, the cells centrifuged down, and washed till the dye disappears from the super-

natant fluid. The cells are then resuspended in saline. The addition of about 0.1 c.cm. of any normal serum or plasma to these sensitized cells brings about haemolysis in a short time.

The similarity between this phenomenon and that observed when serum is added to cells which have been previously mixed with one of the bile salts will at once be apparent. In each case the lysin, brilliant green, or bile salt must first be brought into contact with the cells, and in each case the subsequent addition of normal serum or plasma brings about rapid haemolysis. The similarity is made even more striking by Mackie's observation that, in the case of brilliant green as in the case of the bile salts, it is the serum proteins which are responsible for the reaction, and that if the components of the system are mixed in the reverse order—that is, cells and serum first with subsequent addition of the dye—no haemolysis results. Expressing this more concisely, in the cell-dye-serum system we get rapid lysis, while in the cell-serum-dye system we get an inhibition of lysis.

The first step in the investigation of this phenomenon is to determine the nature of the "sensitization." To all appearances the sensitized suspension is free from brilliant green, but this appearance is quite deceptive; large quantities of the dye can be extracted from the cells by the addition of acetone or alcohol, and it is therefore plain that the repeated washings remove only such portion of the dye as is not united to the cells. Further, the portion of the dye which is united to the cells must be united very loosely, for merely warming the suspension of sensitized cells causes a considerable quantity of brilliant green to be liberated into the fluid surrounding the cells. This liberated dye does not appear to be altered in any way, and it can be used to sensitize more cells. The "sensitization" thus seems to be nothing more than the formation of a loose compound between the brilliant green and the erythrocytes, so that the dye is present as free lysin in the suspension, adsorbed to the cells, and capable of uniting with added serum proteins. Quantitative determinations of the amount of dye adsorbed show, moreover, that the union is not with the envelopes alone, but also with the contained haemoglobin; within the limits of the experimental range, the dye taken up is nearly proportional to the amount used in order to bring about the sensitization.

In a case such as this there are no doubt several hypotheses which might be advanced in order to account for the facts. Of these we have to select the simplest, and that which is the most in keeping with the explanations which are known to be satisfactory in the case of other haemolytic systems; we therefore assume that the adsorbed dye combines with the serum proteins of the added serum to produce a lysin which is haemolytic for the sensitized cells. That the brilliant green is adsorbed to the cells is certain, and that it is capable of uniting with the serum proteins is equally certain; the only obscure point is why the new lysin is either produced only, or effective only, when the latter combination takes place after the occurrence of the former.

On this hypothesis the whole of the complex phenomena can be accounted for. Suppose, to make the matter clear, that one unit of brilliant green is adsorbed to the cells, and that this one unit can unite with one unit of serum protein to form one unit of the new lysin. In these circumstances, if one unit of protein is added to the system containing the sensitized cells, the whole of the dye and the whole of the added protein will unite to form one unit of new lysin. This new lysin will produce haemolysis of the cells in a time, $t$, dependent principally on the concentration of new lysin present. Suppose next that only half a unit of protein is added. The whole of the dye will be unable to combine to form new lysin, for there is insufficient protein for the combination; as much dye as possible will unite, and half a unit of the new lysin will be formed. This will take a longer time, $t_2$, to bring about lysis, for the concentration of the new lysin is only half of that present in the first case. Similarly, if we add smaller and smaller quantities of serum, smaller and smaller quantities of new lysin will be formed, and these will take longer and longer times $t_3$, $t_4$, $t_5$, etc., to bring about haemolysis. When very small amounts of protein are added, there may be so little new lysin formed that complete lysis of the cells will never occur; the result is a partial haemolysis, even after long periods of time.

Experiment shows that these assumptions are in keeping with the facts. As less serum is added, lysis becomes slower, the observed times, $t_1$, $t_2$, $t_3$, etc., corresponding with times which can be calculated from an expression of the form of expression (1). The new lysin, whose concentration is dependent on the quantity of dye which can unite with the added proteins, according to the law of simple proportions, thus acts as a simple haemolysin, the velocity of whose action depends on the concentration present at the moment. In considering the haemolytic reaction in full, the resistances of the cells have, of course, to be taken into account; this being done, the entire kinetics of the reaction can be solved in terms of expressions similar to (1) and (2), just as in the case of a simple haemolysin.

So far as the reaction between the brilliant green and the cells is concerned, we can recognize at least two distinct stages. In the first the dye is adsorbed to the cell envelopes and their contents, still existing as unaltered brilliant green or as free lysin. In the second, which occurs after a long period of time, a reaction which results in haemolysis occurs between the adsorbed dye and the cell envelopes. It is essential to note that the union of the dye with the serum proteins, and the production of the new lysin which we have been considering, occurs in the first of these two stages. If we replace the brilliant green by sodium taurocholate, we get very similar occurrences taking place; the problem is, however, far more complex, because the reaction which results in haemolysis begins immediately the bile salt is added to the cells. There is thus never a stage of "sensitization" at which the reaction can be stopped short, for the taurocholate, which is haemolytic by itself, is continually attacking the cell envelopes, with the result that the free lysin in the system is continually decreasing. The amount of free lysin at any moment can, however, be calculated quite easily, so that, if at any moment we add serum, we can say just how much free lysin is present in the system to react with the added protein, as well as the amount of taurocholate which has been transformed as the result of the primary haemolytic reaction. In adding serum, we have therefore to be careful that the extent to which this primary reaction has proceeded is allowed for, so that all additions are made under known conditions. Although this involves an elaborate technique, it leads to results which are capable of explanation. They show that the phenomena observed with the bile salt are identical with those observed with brilliant green, the taurocholate replacing the dye as a "sensitizing agent," although it is haemolytic by itself; the sensitization seems to be due to a loose combination of the bile salt with the cells, and the lysis which follows the addition of serum to the formation of a new lysin as a result of the combined taurocholate uniting with the added proteins. Unless care is taken, however, the reaction is influenced by inhibition phenomena; although the nature of the reaction itself is clear, the effect of these secondary reactions still needs investigation.

### 5. *Cell-Complement-Silicic Acid Systems.*

These systems have attracted a great deal of attention since the discovery by Landsteiner and Jagic[16] that colloidal silicic acid can replace amboceptor in complement-amboceptor systems. The colloidal silicic acid is best prepared from ethyl silicate, and the complement used should be that contained in guinea-pig serum after removal of the native haemolysins. As there is no specificity attached to the reaction, any type of red cell can be employed.

In one respect at least these systems resemble those already considered, for the velocity of the haemolytic reaction depends on the order in which the components of the system are brought together. The complement should be added to the cells first, and the two allowed to stand for a short time; the subsequent addition of silicic acid then brings about a rapid lysis. The following remarks apply only to systems in which this order of mixing is observed.

The most interesting point in connexion with these systems is the way in which the velocity of the haemolysis

varies with the quantity of complement and of silicic acid.[17] Adding a constant amount of silicic acid, which is non-lytic by itself, to systems containing an increasing amount of complement, we get increasingly rapid lysis until a certain maximum is reached; with greater amounts of complement, however, the lysis becomes slower once more, until finally there is no haemolysis at all. There is thus, for every quantity of silicic acid, one particular quantity of complement which gives a maximum velocity of lysis; quantities greater or less than this give less rapid lysis, or none at all.

These maxima possess a special property which greatly simplifies the kinetics of the systems, for the ratio of complement to silicic acid at any maximum is always constant. For example, if with 0.5 c.cm. of silicic acid we need 0.2 c.cm. of complement to give a maximum, we shall require 0.1 c.cm. of complement with 0.25 c.cm. of silicic acid, or 0.02 c.cm. of complement to give a maximum with 0.05 c.cm. of silicic acid. But the most remarkable point of all is that when complement and silicic acid are added in this ratio which gives the maxima, lysis proceeds as if the lysin were a simple haemolysin. The kinetics of the system become capable of expression in terms of expressions (1) and (2), and all complexity seems to have disappeared. So far as this evidence is concerned, we are therefore justified in assuming that the complement and the silicic acid unite to form a simple haemolysin, provided that they are present in certain proportions.

Too much complement on the one hand, or too much silicic acid on the other, results in a haemolysis slower than at the maximum. In such systems the kinetics have still to be reduced to simple laws; we know, however, that the slower lysis is the result of a reaction very like the inhibition of a simple lysin by serum. Suppose, for instance, that the ratio for the maxima is one unit of complement to one unit of silicic acid. If we add to one unit of complement three units of silicic acid, two of the added units cannot combine to form the lysin, as there is insufficient complement; these two units act as an adsorbent, ready to adsorb and to render inactive the lysin as it is formed. Excess of complement acts in the same way, for the proteins in the complement-containing serum are scarcely inferior to colloidal silicic acid as an adsorbent; only when there is no excess of either component is the newly formed lysin free to act without inhibition.

This completes the account of the problems which connect the simplest haemolytic systems with the most complex, for the next step in order of complexity is the problem of the kinetics of the complement-amboceptor systems themselves. In general, these systems are similar to cell-complement-silicic acid systems; they are, indeed, in some respects even less complex, for the inhibition phenomena are less marked. They can be investigated by the same methods as are applicable to the simpler haemolysins, and their complete elucidation is only a matter of time.

As a review of what is known about haemolysis in general this account is very incomplete. All consideration of haemolysis by hypotonic saline, cobra venom, and ultra-violet light is omitted; no mention has been made of the results of the investigations into the changes of form which the cells undergo during lysis, nor is there any reference to the effects of salts, sugars, and other such substances on the action of the various haemolysins. The necessary degree of compression precludes even the description of the essentials of the technique employed. The paper therefore gives quite an inadequate idea of the weight of the evidence on which the conclusions are based, and accordingly the reader may be left with the impression that some of the explanations offered are rather too simple to be true. It is to be remembered, however, that the almost notorious complexity of most of the less simple haemolytic systems is very largely the result of investigation by methods which are often faulty in themselves and which are never strictly quantitative. It is only when technique is rigidly standardized, and when every variable is subjected to exact measurement, that the apparent complexity disappears.


REFERENCES.

[1] Ponder, E. (1924): *Proc. Roy. Soc.*, B, 94, 138. [2] Seifriz (1927): *Protoplasma*, 1. [3] Oliver, J., and Barnard, L. (1925): *Amer. Journ. Physiol.*, 73, 401. [4] Ponder, E. (1927): *Proc. Roy. Soc.*, B, 101, 193. [5] Brooks, S. C. (1920): *Journ. Gen. Physiol.*, 1, 61. [6] Kofler, L., and Lazar, Z. (1927): *Wien. klin. Woch.*, 1. [7] Ponder, E., and McLachlan, D. G. S. (1927): *Brit. Journ. Exper. Path.* (in press). [8] Ponder, E. (1924): *Biochem. Journ.*, 18, 845. [9] Bayer, G. (1907): *Biochem. Zeit.*, 4, 368. [10] Ponder, E. (1925): *Proc. Roy. Soc.*, B, 98, 484. [11] Kennedy, W. P. (1925): *Biochem. Journ.*, 19, 318. [12] Donnelly and Graeme Mitchell (1927): *Amer. Journ. Physiol.*, 80, No. 2. [13] Ponder, E. (1922): *Proc. Roy. Soc.*, B, 93, 86. [14] Browning, C., and Mackie, T. J. (1914): *Zeit. f. Immunitäts.*, 21, 422. [15] Mackie, T. J. (1919): *Trans. Roy. Soc. South Africa*, 8, 59. [16] Landsteiner and Jagic (1904): *Wien. klin. Woch.*, No. 3. [17] Browning, C., and Mackie, T. J. (1914): *Zeit. f. Immunitäts.*, 422.


## DISCUSSION.

Professor J. MELLANBY discussed the action of enzymes on the red blood corpuscles. He pointed out that the cell envelope could not be acted upon by either trypsin or lipase. Haemoglobin was found to be digested by enzymes, and there was, therefore, evidence that a protective layer or envelope existed which protected the haemoglobin. It was shown that at the end of haemolysis the amboceptor disappeared while the complement was still present in an intact form. The speaker stated that probably in the Wassermann test the complement was precipitated by the syphilitic substance in the presence of the antigen.

Sir E. SHARPEY-SCHAFER questioned the reversal changes described.

Dr. ERIC PONDER, in reply, said that in his opinion there was no fundamental difference between the kinetics of the complement-amboceptor systems and of silicic acid and simple lysins.

# THE PLACE OF BISMUTH IN THE TREATMENT OF SYPHILIS.*


BY

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DURING 1921 Sazerac and Levaditi were able to prove that experimental syphilis in rabbits could be treated successfully with a bismuth preparation. In the following year the same workers, and Fournier and Guenot, submitted a series of cases of human syphilis to treatment with a salt of bismuth, and found that the active signs of disease disappeared rapidly, and that this drug appeared to be able to exercise a favourable influence, at least in the earlier cases, on the serological reactions of the blood. Subsequent to the publication of this work in France bismuth and its salts same into general use, and bismuth is now accepted as one of the few drugs which can favourably influence the progress of syphilitic infection.

In considering the place of any drug in the treatment of syphilis it is essential to take into consideration the value of that drug as compared with existing and well known therapeutic remedies, and to review our present knowledge as to—

(*a*) The effect of bismuth on the *Spirochaeta pallida in vivo*.
(*b*) Its effect on the surface lesions of syphilis in all stages.
(*c*) Its effect on the serological reactions in all stages of syphilis.
(*d*) Its effect on the general health of the patient.
(*e*) The toxicity of bismuth and the immediate or remote side effects to which it may possibly give rise.
(*f*) The permanency of the results obtained by its use.

In the limited time available I propose to give a short summary of the observations which it has been possible to make during an extensive clinical experience of the use of this drug in over 6,000 cases of syphilis. The number of injections of bismuth given in this series was over 100,000. In some of the cases bismuth was the only drug used; in others it was used in combination with drugs of the arsenobenzol series and with tryparsamide; in others it was administered with mercury and some form of iodide.

* A paper read in opening a discussion on this subject in the Section of Venereal Diseases at the Annual Meeting of the British Medical Association at Edinburgh. Mr. Lees was President of the Section.

Among the many bismuth preparations which are available, the following have been used: (1) soluble preparations, (2) insoluble preparations suspended in oil, (3) insoluble preparations suspended in glucose or water. Different preparations from each of these groups, and especially from the latter, have been used, and, from practical experience, the preparation which gives the most consistently good results with the least likelihood of upset to the patient is one of insoluble bismuth in a very fine suspension in isotonic glucose solution. It should contain a high percentage of bismuth, and the drug should, in our opinion, be given intramuscularly.

### *The Action of Bismuth in Destroying the Spirochaeta pallida in vivo.*

When a therapeutic dose of bismuth is administered intramuscularly to a patient suffering from a primary chancre or a secondary rash in which the *Spirochaeta pallida* has been demonstrated, the organism is not destroyed so rapidly as it is when a therapeutic dose of one of the arsenobenzols is given either intravenously or intramuscularly. After an arsenobenzol product is administered we can rarely find a living spirochaete in the surface lesion twenty-four hours later; whereas after a potent therapeutic dose of almost any bismuth preparation, spirochaetes can not infrequently be demonstrated for three or four days subsequently. From this we may assume that bismuth does not act so rapidly in reducing the contagion of syphilis. This slowness of action is not due to the slower absorption because the bismuth is administered intramuscularly. We have had the same experience when comparing the effect of an intramuscular injection of sulpharsenol with that of an intramuscular injection of bismuth. We have noted the same slowness of action after the intravenous injection of colloidal bismuth.

### *The Effect of Bismuth on the Surface Lesions of Syphilis in all Stages.*

The continued administration of bismuth intramuscularly causes the primary sore, the surface skin lesions, and the later gummatous manifestations to disappear rapidly, and in this respect bismuth is almost as efficient as the salvarsan preparations. It is much more rapid in its action on these signs of active syphilis than any of the mercurial preparations. In this respect it would seem to be almost the equal of, and occasionally superior to, the arsenical drugs. In three cases which were seen by the author, all of which were in the nature of hypertrophic papular syphilides of a recurrent type, the administration of bismuth rapidly cleared up the eruption when arsenic in one case, and arsenic and mercury in combination in the two others, had previously failed to do so.

The first patient, a case of primary syphilis with a strong positive Wassermann reaction, had been treated by a complete course of novarsenobillon, totalling 4.3 grams in a period of eight weeks. Three weeks later a papular syphilide appeared on the face. A second course of 3.00 grams of novarsenobillon was administered in the succeeding seven weeks, and one month later the papules again recurred. Bismuth was administered intramuscularly, and after three injections of "hypoloid" bismuth the papules disappeared and have not recurred since. The bismuth treatment was continued in this case for close on two years and the patient has been under observation for over eighteen months since. There has been no recurrence of any clinical sign of syphilis, and the Wassermann test has been consistently negative for over two years.

In the second case, one of early generalized syphilis, the patient had had a course of injections of neokharsivan and simultaneously mercury was being given by the mouth. The total amount of neokharsivan administered in eight weeks was 4.05 grams. Six weeks subsequent to this course a papular syphilide appeared at the angles of the mouth and nose. Bismuth was administered, and the patient, apart from appropriate intervals of rest, has now been under treatment with bismuth and iodides for two years. There has been no recurrence of the clinical signs; the blood Wassermann after two courses of bismuth became negative and has continued negative up to the present.

The third case is even more striking.

A patient with a primary sore of ten days' duration and a weak positive Wassermann test was treated during the first three months with neosalvarsan and mercury (grey oil), 4.5 grams of the former intravenously and 7 grains of the latter intramuscularly. Some three to four weeks after this treatment a circinate syphilide appeared on the forehead and palmar and plantar syphilides on the hands and feet. A second intravenous course consisting of 4 grams of novarsenobillon and an intramuscular course of 8 grains of mercury (grey oil) was administered, but failed to influence the skin eruptions. Intramine and colloidal iodine were then given, the former intramuscularly and the latter intravenously in large doses. This was followed by a course of intramuscular injections of grey oil, the total quantity given being equivalent to 16 grains of metallic mercury. Potassium iodine was also given in large doses (20 grains thrice daily) by the mouth. As this course of treatment failed to influence the syphilides, silver salvarsan was administered in weekly injections to a total of 3 grams in eight weeks. The syphilides disappeared temporarily during this treatment, but recurred six weeks later. Protein therapy was tried, T.A.B. vaccine was injected, and this was followed by a course of neo-silver salvarsan and mercury. There was no sign of syphilis for three months after this, but subsequently the plantar syphilides reappeared and also a recurrent papulo-squamous syphilide on the forehead and on the extensor aspect of one elbow. Bismuth was now exhibited, and four courses, totalling about 15 grams of metallic bismuth, were given in the following year. After the third injection of bismuth in the first course the signs of syphilis on the skin completely disappeared and they have not recurred since. The blood Wassermann reaction became negative after the first course of 4 grams of bismuth and it has remained negative since. This patient has been under observation for close on two years without treatment and has had no recurrence of any sign of syphilis, and the blood Wassermann and cerebro-spinal fluid have remained negative throughout.

While these may be isolated cases they are impressive, and there are undoubtedly certain cases of syphilis in which the surface signs react extremely well to bismuth, and better than they do to salvarsan and its derivatives.

### *The Effect of Bismuth on the Serological Reactions in all Stages of Syphilis.*

If bismuth is administered to any case of syphilis before the Wassermann test has become positive, and if the Wassermann test, taken again seven days subsequent to the first injection, is still negative (sero-negative syphilis), it is our experience that very few of these cases, if the bismuth treatment is persevered with, will ever develop a positive reaction in the blood. One or two of our cases, however, have developed positive reactions when so treated, and Parnell has quoted similar cases. In all the cases in which this has occurred the second test taken within a week after the first treatment showed a weak positive reaction. It is our experience that the development of a positive reaction in a case of sero-negative syphilis treated with the arsenobenzols is extremely rare. Bismuth, therefore, would not seem to be so potent as the arsenobenzols in making certain that a sero-negative case does not become sero-positive.

When comparing the effect of bismuth with that of the arsenobenzols on the reactions of sero-positive syphilis in the primary and early generalization stages, as assessed by the Wassermann test, taken at least one month after a course of treatment, the percentage of negative findings after bismuth is not, in our opinion, so large as with the arsenicals. It is certainly much inferior to that obtained when salvarsan and bismuth or salvarsan and mercury are administered concurrently. In late syphilis and latent syphilis it is difficult to estimate comparatively the effect of bismuth and salvarsan respectively on the Wassermann test. Both are successful in a considerable number of cases, while in others both fail to render it negative. In cases in which we have failed to influence the Wassermann test by combinations of salvarsan and mercury or salvarsan and iodides, bismuth also has failed, and we have not as yet been able to find any drug or combination of drugs which will permanently influence certain cases with resistant Wassermann reactions. It is our experience that bismuth is rather more potent than is the intravenous injection of the arsenicals in altering some of the pathological reactions in the cerebro-spinal fluid in certain types of case.

### *The Effect of Bismuth on the General Health of the Patient.*

When bismuth is given in therapeutic doses it appears to influence the patient's general health beneficially, and especially so if before and during the time of its administration the hygiene of the mouth is attended to. The arsenobenzols also have a tonic action, but it is our experience that old and debilitated patients tolerate bismuth in appropriate doses rather better than they tolerate the arsenobenzols. In cases which have shown

themselves sensitive to the arsenobenzols, bismuth is often well tolerated and greatly benefits the health of the patient. It does not appear to be so depressing in its action as mercury, and there is not the same tendency on the part of the patient to lose weight when under bismuth treatment as when mercury is being administered.

*The Toxicity of Bismuth and its Immediate and Remote Side-Effects.*

In therapeutic doses bismuth gives rise to remarkably few toxic symptoms if the technique of its administration is good. There is practically no pain subsequent to its administration such as there is subsequent to the intramuscular administration of mercury, and there is certainly less discomfort than there is with the intramuscular administration of arsenicals such as sulpharsenol or kharsulphan. The main toxic condition to which it gives rise is stomatitis. This can be obviated by careful cleansing of the mouth and care of the teeth. When it does arise it is not so severe as is the stomatitis set up by mercury. It can be rapidly controlled and ameliorated by the administration of sodium thiosulphate and by oral hygiene. Other toxic effects of bismuth are albuminuria, urticarial eruptions, mild erythemata, and loss of weight. If ordinary care is exercised in the administration of the drug, and if appropriate intervals are allowed between successive doses, these complications are rare when metallic bismuth is used. Bismuth, in fact, can be given with advantage to many cases of nephritis and to many debilitated patients who would not tolerate the arsenobenzols. In general, it is a much less toxic drug than the arsenobenzols and less toxic than mercury. If care is taken that none of the drug is introduced into a vein there are practically no immediate side-effects in the great majority of cases. It does not seem to damage the liver to the same extent as do the arsenobenzols, nor the kidneys to the same extent as mercury, and rarely if ever is an injection of it followed by a Herxheimer reaction.

*Permanence of the Results of Bismuth Treatment.*

We have referred to the fact that cases of sero-negative syphilis may not always remain so while under treatment with bismuth alone, but there are undoubtedly other cases of established syphilis which have been cured both clinically and serologically by bismuth alone, and have remained so over periods up to three years. The period during which treatment by bismuth alone has been observed in most cases is as yet too short to enable us to state definitely that its results are permanent, and, in addition, there is up to now no general agreement as to what is the requisite amount of the drug to administer so as to ensure permanent negative serological tests and a complete cure.

The therapeutic power of bismuth compounds in comparison with that of the salvarsan group of drugs when each is used alone may be recapitulated as follows:

Bismuth does not so rapidly kill spirochaetes in the early contagious stages of syphilis, and therefore does not so rapidly reduce contagion.

Bismuth has almost as rapid an effect as the salvarsan derivatives in clearing up the surface manifestations of syphilis in all stages of the disease.

Bismuth is less likely to cause intolerance and side-effects, especially in devitalized patients, and in general its intramuscular administration is followed by less constitutional upset than is the intravenous or intramuscular administration of the arsenicals.

Bismuth does not so certainly control the Wassermann and flocculation tests as do the arsenicals, although there are cases in which it very favourably influences these serological tests when other drugs have failed to do so.

When we compare the effect of bismuth with that of mercury, when each is administered alone, the evidence is undoubtedly strong that, of the two, bismuth is the more potent drug in syphilis, both in its effect on the surface lesions and on the serological tests. Bismuth kills the surface spirochaetes and heals up the skin manifestations more rapidly than mercury; there is less pain after its intramuscular administration, and it is followed by fewer signs of intolerance; it also has a more rapid action than mercury on the blood Wassermann and other tests. In therapeutic efficiency bismuth seems to approximate much more closely to the arsenobenzols than mercury when these drugs are exhibited alone in any given case of syphilis.

*The Use of Bismuth in Combination with other Drugs.*

For a long time we have held the opinion that, in the treatment of syphilis in all its stages, with the possible exception of cases of pregnancy, it is advisable to administer conjointly both arsenic and mercury in preference to either alone. Since the introduction of bismuth we have come to the same conclusion with regard to it, and we are firmly of opinion that with few exceptions the joint administration of arsenic and bismuth is preferable to that of either alone. The joint administration of these drugs is comparatively safe, it is well tolerated, and the results in the large majority of cases so treated are highly satisfactory. It is impossible to deny that the therapeutic results following the joint administration of arsenic and mercury were very good, and especially so if the mercurial drug was administered intramuscularly, so as to ensure certainty and accuracy of dosage. The joint administration of arsenic and bismuth has, in our experience, given slightly better results. There is, however, the great advantage from this latter combination that there is practically no discomfort or pain following the intramuscular injections of bismuth, and, if due precautions are taken as to the teeth and as to the technique of administration, no intolerance is set up such as occasionally follows the joint arsenic and mercurial treatment. The fact that bismuth is being administered to any given case is not, in our opinion, a reason for lessening the amount of the arsenical drug, and even with the dual therapy there are still some cases of resistant syphilis which are slow to react favourably, although seen and treated intensively at a fairly early period of the infection.

If at any time a rest from either drug is considered advisable, iodides may be substituted, and can be given alike with either arsenic or bismuth.

In several cases we have tried the effect of giving bismuth in combination with mercury, the latter in such cases being given intravenously as mercury cyanide. The two drugs do not, in our opinion, go well together. These two drugs are not dissimilar in their action, and they give rise to toxic effects on the same structures of the body. Their joint administration is apt to lead to depression, loss of weight, neuritic symptoms, and to stomatitis. In any cases which showed a very resistant positive Wassermann test we have not been able to influence it permanently by this combination any more effectually than by other and safer methods of treatment.

*Tolerance of the Patient to the Various Drugs when Administered over Long-continued Periods.*

With the arsenobenzols great care must be taken to avoid too intensive treatment over long periods, because of the risk of cumulative effect and the possible onset of such conditions as jaundice and exfoliating dermatitis. In long-continued mercurial treatment stomatitis, diarrhoea, and albuminuria are not infrequent, and the discomfort following on intramuscular therapy by mercury is against its long-continued use. Bismuth can be given over long periods without pain and with comparative safety.

In bismuth therapy there is no complication of any importance which cannot be easily counteracted or controlled. So far as safety of administration is concerned, we are of opinion that either alone, or in combination with an arsenical or iodide drug, bismuth can be given over long periods with comparative comfort and safety.

*Combination of Drugs and their Influence in Preventing Neurosyphilis.*

There is considerable evidence to show, and a general consensus of opinion, that the joint administration of arsenic and mercury is superior to that of an arsenical drug alone, especially in the prevention of the later manifestations of syphilis. So far as the combination of arsenic and bismuth is concerned, it is our opinion that the joint administration of these drugs is superior in its action to that of either alone, especially in early cases of syphilis. It is too early as yet to make a dogmatic statement on the

subject, but we are inclined to the opinion that the two drugs if given together in every case of early syphilis will tend to prevent the later manifestations of syphilis, just as does the joint administration of arsenic and mercury.

As regards the comparative therapeutic efficiency of the two combinations, we are not as yet in a position to judge. In our own cases the end-results are almost similar if viewed from the standpoint of the disappearance of the symptoms and signs of disease. If judged from the standpoint of their effect on the Wassermann reaction there is also very little difference in the results. Where they differ most is in the fact that the combination of arsenic and bismuth is better tolerated by the individual patient, is followed by fewer signs of intolerance, and gives rise to less pain and discomfort.

This latter fact alone is of very considerable importance in hospital work, in that patients more willingly continue under treatment for long periods. There have been very few published statistics of the comparative effect of the two combinations, and those of Smechula of Hanover published in the *Klinische Wochenschrift* of July 30th, 1925, are interesting. He selected two series of 100 cases, as like each other as possible, and compared the efficacy of neosalvarsan and mercury salicylate with that of neosalvarsan and bismuth. His findings were that neosalvarsan and mercury were superior in their action in secondary syphilis and still more so in their rapidity in changing a positive to a negative Wassermann test in latent cases. He was of opinion, however, that the administration of neosalvarsan and bismuth was followed by fewer relapses than that of neosalvarsan and mercury.

Our observations on the comparison of cases so treated do not agree with those of Smechula. We are of opinion that arsenic and bismuth jointly administered influence secondary lesions rather more rapidly than arsenic and mercury. Arsenic and bismuth in our experience has also produced a negative Wasermann test in latent syphilis more often than arsenic and mercury. We agree with him that there are very few relapses met with if either arsenic and bismuth, or arsenic and mercury are used, but this is more dependent on the long continuity of the treatment than on the combination used. The combination of arsenic and bismuth is, we think, much more efficacious in many cases of neurosyphilis than is that of arsenic and mercury.

In their enthusiasm over bismuth several workers have discarded not only mercury but also the arsenicals in the treatment of syphilis. This is to be deprecated, and especially so in early and contagious syphilis. Arsenical medication is undoubtedly our most efficient method of dealing with syphilis and rendering it rapidly non-contagious, and it cannot be removed from its place of pride by bismuth. Mercury also has still a place in specific medication, but must give way to bismuth for routine use since it is less well tolerated, in that its administration causes rather more discomfort: it is, moreover, slower in its action in killing spirochaetes, in healing the surface lesions, and in its effect on the Wassermann test.

The arguments on which the superiority of bismuth to salvarsan rest are based solely on isolated cases, of which most of us have had experience, and of which I have quoted three. There is no doubt that bismuth is an extremely valuable drug, and that its discovery as an efficient therapeutic agent in syphilis must be regarded as one of the most important developments of therapy during the last few years. We must not, however, allow our enthusiasm over its effects in isolated cases to outrun our discretion and make us lose sight of its deficiencies and of its inferiority to the salvarsan derivatives. What can be said of bismuth is that it is a very valuable addition to the treatment of syphilis, and especially if it is used in combination with the arsenobenzols. It is peculiarly effective and safe in most of the cases which show intolerance to the arsenicals and to mercury. In cases which are proving resistant to arsenic or mercury it not infrequently gives brilliant results in causing the disappearance of the specific lesions. In some cases of neurosyphilis and congenital syphilis it apparently gives better results in clearing up the symptoms and signs of disease than either arsenic or mercury. It is undoubtedly also a safer method of treatment in some of the devitalized subjects who suffer from syphilis, such as cases of cardio-vascular and visceral syphilitic disease.

It is important, in our view, that in every case of syphilis in its earlier stages a combination of either arsenic and bismuth, or arsenic and mercury, should be given, and that this combination should be continued up to the point of tolerance until both the clinical and the serological manifestations are cleared up. In the subsequent period of treatment we are of opinion that both drugs should still be continued, but the amount of the arsenical drug may then be conveniently lessened with a view to avoiding intolerance. The advent of bismuth may in the course of time enable us to lessen the quantity of the joint therapy which is necessary to control and possibly cure syphilis, but as yet there is far too little evidence of the definite permanency of the results obtained to justify anyone in reducing the time during which any case of syphilis should remain under active treatment and observation.

Bismuth in therapeutic doses can certainly be given over very long periods without in any way inconveniencing the patient to the same extent as mercury does, and this fact alone renders it of very considerable value in the treatment of resistant cases of infection and of old and debilitated patients.

If we were to summarize the present place of bismuth in the therapy of syphilis, we would be justified in coming to the following conclusions:

1. Bismuth is an active antisyphilitic drug and is more rapid in its destructive action on the *Spirochaeta pallida in vivo* than mercury; it is not so rapid as the salvarsan group of drugs in this respect.
2. Bismuth influences the surface lesions of syphilis as rapidly as the arsenobenzols, and more rapidly than mercury.
3. Bismuth, with few exceptions, is less active than the arsenobenzols in influencing the Wassermann test, but is more active than mercury in this respect.
4. The combined administration of bismuth and arsenic is more potent than either drug alone and is free from danger if given in therapeutic doses. The same holds good of arsenic and mercury.
5. The administration of metallic bismuth in isotonic glucose solution is remarkably free from pain and side-effects, and in this respect is better tolerated than either arsenic or mercury.
6. Bismuth is a very valuable drug in cases of syphilis which are intolerant to treatment by arsenic or mercury.
7. Bismuth is a very valuable drug in the treatment of any patient who has advanced organic disease, whether the latter is due to, or is intercurrent with, the syphilis.
8. The intramuscular injection of an insoluble compound of bismuth gives better therapeutic results with less risk of toxic effects than other methods of administering it, such as the intravenous administration of colloidal bismuth or the intramuscular injection of the salts of bismuth.
9. The addition of bismuth and its salts to the other available methods of treatment does not as yet justify anyone in lessening the length of time over which every case of syphilis should be treated and kept under observation.
10. Apart from cases of intolerance to other drugs, bismuth is only an adjuvant to the treatment of syphilis and should not be used alone, even in the very earliest cases of infection.

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### DISCUSSION.

Dr. J. C. BUCKLEY (Nottingham) considered the introduction of bismuth second in importance only to that of salvarsan. He expressed optimistic views as to the prognosis in early cases of syphilis, and thought that nearly all could be cured by a properly conducted dual therapy. He had found bismuth particularly useful in patients who were intolerant of arsenic, and only in interstitial keratitis was mercury more valuable than bismuth. It was not justifiable to give bismuth alone in early cases of syphilis, but it should be combined with arsenic. The dose he gave

themselves sensitive to the arsenobenzols, bismuth is often well tolerated and greatly benefits the health of the patient. It does not appear to be so depressing in its action as mercury, and there is not the same tendency on the part of the patient to lose weight when under bismuth treatment as when mercury is being administered.

*The Toxicity of Bismuth and its Immediate and Remote Side-Effects.*

In therapeutic doses bismuth gives rise to remarkably few toxic symptoms if the technique of its administration is good. There is practically no pain subsequent to its administration such as there is subsequent to the intramuscular administration of mercury, and there is certainly less discomfort than there is with the intramuscular administration of arsenicals such as sulpharsenol or kharsulphan. The main toxic condition to which it gives rise is stomatitis. This can be obviated by careful cleansing of the mouth and care of the teeth. When it does arise it is not so severe as is the stomatitis set up by mercury. It can be rapidly controlled and ameliorated by the administration of sodium thiosulphate and by oral hygiene. Other toxic effects of bismuth are albuminuria, urticarial eruptions, mild erythemata, and loss of weight. If ordinary care is exercised in the administration of the drug, and if appropriate intervals are allowed between successive doses, these complications are rare when metallic bismuth is used. Bismuth, in fact, can be given with advantage to many cases of nephritis and to many debilitated patients who would not tolerate the arsenobenzols. In general, it is a much less toxic drug than the arsenobenzols and less toxic than mercury. If care is taken that none of the drug is introduced into a vein there are practically no immediate side-effects in the great majority of cases. It does not seem to damage the liver to the same extent as do the arsenobenzols, nor the kidneys to the same extent as mercury, and rarely if ever is an injection of it followed by a Herxheimer reaction.

*Permanence of the Results of Bismuth Treatment.*

We have referred to the fact that cases of sero-negative syphilis may not always remain so while under treatment with bismuth alone, but there are undoubtedly other cases of established syphilis which have been cured both clinically and serologically by bismuth alone, and have remained so over periods up to three years. The period during which treatment by bismuth alone has been observed in most cases is as yet too short to enable us to state definitely that its results are permanent, and, in addition, there is up to now no general agreement as to what is the requisite amount of the drug to administer so as to ensure permanent negative serological tests and a complete cure.

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When we compare the effect of bismuth with that of mercury, when each is administered alone, the evidence is undoubtedly strong that, of the two, bismuth is the more potent drug in syphilis, both in its effect on the surface lesions and on the serological tests. Bismuth kills the surface spirochaetes and heals up the skin manifestations more rapidly than mercury; there is less pain after its intramuscular administration, and it is followed by fewer signs of intolerance; it also has a more rapid action than mercury on the blood Wassermann and other tests. In therapeutic efficiency bismuth seems to approximate much more closely to the arsenobenzols than mercury when these drugs are exhibited alone in any given case of syphilis.

*The Use of Bismuth in Combination with other Drugs.*

For a long time we have held the opinion that, in the treatment of syphilis in all its stages, with the possible exception of cases of pregnancy, it is advisable to administer conjointly both arsenic and mercury in preference to either alone. Since the introduction of bismuth we have come to the same conclusion with regard to it, and we are firmly of opinion that, with few exceptions the joint administration of arsenic and bismuth is preferable to that of either alone. The joint administration of these drugs is comparatively safe, it is well tolerated, and the results in the large majority of cases so treated are highly satisfactory. It is impossible to deny that the therapeutic results following the joint administration of arsenic and mercury were very good, and especially so if the mercurial drug was administered intramuscularly, so as to ensure certainty and accuracy of dosage. The joint administration of arsenic and bismuth has, in our experience, given slightly better results. There is, however, the great advantage from this latter combination that there is practically no discomfort or pain following the intramuscular injections of bismuth, and, if due precautions are taken as to the teeth and as to the technique of administration, no intolerance is set up such as occasionally follows the joint arsenic and mercurial treatment. The fact that bismuth is being administered to any given case is not, in our opinion, a reason for lessening the amount of the arsenical drug, and even with the dual therapy there are still some cases of resistant syphilis which are slow to react favourably, although seen and treated intensively at a fairly early period of the infection.

If at any time a rest from either drug is considered advisable, iodides may be substituted, and can be given alike with either arsenic or bismuth.

In several cases we have tried the effect of giving bismuth in combination with mercury, the latter in such cases being given intravenously as mercury cyanide. The two drugs do not, in our opinion, go well together. These two drugs are not dissimilar in their action, and they give rise to toxic effects on the same structures of the body. Their joint administration is apt to lead to depression, loss of weight, neuritic symptoms, and to stomatitis. In any cases which showed a very resistant positive Wassermann test we have not been able to influence it permanently by this combination any more effectually than by other and safer methods of treatment.

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There is considerable evidence to show, and a general consensus of opinion, that the joint administration of arsenic and mercury is superior to that of an arsenical drug alone, especially in the prevention of the later manifestations of syphilis. So far as the combination of arsenic and bismuth is concerned, it is our opinion that the joint administration of these drugs is superior in its action to that of either alone, especially in early cases of syphilis. It is too early as yet to make a dogmatic statement on the

subject, but we are inclined to the opinion that the two drugs if given together in every case of early syphilis will tend to prevent the later manifestations of syphilis, just as does the joint administration of arsenic and mercury.

As regards the comparative therapeutic efficiency of the two combinations, we are not as yet in a position to judge. In our own cases the end-results are almost similar if viewed from the standpoint of the disappearance of the symptoms and signs of disease. If judged from the standpoint of their effect on the Wassermann reaction there is also very little difference in the results. Where they differ most is in the fact that the combination of arsenic and bismuth is better tolerated by the individual patient, is followed by fewer signs of intolerance, and gives rise to less pain and discomfort.

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In their enthusiasm over bismuth several workers have discarded not only mercury but also the arsenicals in the treatment of syphilis. This is to be deprecated, and especially so in early and contagious syphilis. Arsenical medication is undoubtedly our most efficient method of dealing with syphilis and rendering it rapidly non-contagious, and it cannot be removed from its place of pride by bismuth. Mercury also has still a place in specific medication, but must give way to bismuth for routine use since it is less well tolerated, in that its administration causes rather more discomfort; it is, moreover, slower in its action in killing spirochaetes, in healing the surface lesions, and in its effect on the Wassermann test.

The arguments on which the superiority of bismuth to salvarsan rest are based solely on isolated cases, of which most of us have had experience, and of which I have quoted three. There is no doubt that bismuth is an extremely valuable drug, and that its discovery as an efficient therapeutic agent in syphilis must be regarded as one of the most important developments of therapy during the last few years. We must not, however, allow our enthusiasm over its effects in isolated cases to outrun our discretion and make us lose sight of its deficiencies and of its inferiority to the salvarsan derivatives. What can be said of bismuth is that it is a very valuable addition to the treatment of syphilis, and especially if it is used in combination with the arsenobenzols. It is peculiarly effective and safe in most of the cases which show intolerance to the arsenicals and to mercury. In cases which are proving resistant to arsenic or mercury it not infrequently gives brilliant results in causing the disappearance of the specific lesions. In some cases of neurosyphilis and congenital syphilis it apparently gives better results in clearing up the symptoms and signs of disease than either arsenic or mercury. It is undoubtedly also a safer method of treatment in some of the devitalized subjects who suffer from syphilis, such as cases of cardio-vascular and visceral syphilitic disease.

It is important, in our view, that in every case of syphilis in its earlier stages a combination of either arsenic and bismuth, or arsenic and mercury, should be given, and that this combination should be continued up to the point of tolerance until both the clinical and the serological manifestations are cleared up. In the subsequent period of treatment we are of opinion that both drugs should still be continued, but the amount of the arsenical drug may then be conveniently lessened with a view to avoiding intolerance. The advent of bismuth may in the course of time enable us to lessen the quantity of the joint therapy which is necessary to control and possibly cure syphilis, but as yet there is far too little evidence of the definite permanency of the results obtained to justify anyone in reducing the time during which any case of syphilis should remain under active treatment and observation.

Bismuth in therapeutic doses can certainly be given over very long periods without in any way inconveniencing the patient to the same extent as mercury does, and this fact alone renders it of very considerable value in the treatment of resistant cases of infection and of old and debilitated patients.

If we were to summarize the present place of bismuth in the therapy of syphilis, we would be justified in coming to the following conclusions:

1. Bismuth is an active antisyphilitic drug and is more rapid in its destructive action on the *Spirochaeta pallida in vivo* than mercury; it is not so rapid as the salvarsan group of drugs in this respect.

2. Bismuth influences the surface lesions of syphilis as rapidly as the arsenobenzols, and more rapidly than mercury.

3. Bismuth, with few exceptions, is less active than the arsenobenzols in influencing the Wassermann test, but is more active than mercury in this respect.

4. The combined administration of bismuth and arsenic is more potent than either drug alone and is free from danger if given in therapeutic doses. The same holds good of arsenic and mercury.

5. The administration of metallic bismuth in isotonic glucose solution is remarkably free from pain and side-effects, and in this respect is better tolerated than either arsenic or mercury.

6. Bismuth is a very valuable drug in cases of syphilis which are intolerant to treatment by arsenic or mercury.

7. Bismuth is a very valuable drug in the treatment of any patient who has advanced organic disease, whether the latter is due to, or is intercurrent with, the syphilis.

8. The intramuscular injection of an insoluble compound of bismuth gives better therapeutic results with less risk of toxic effects than other methods of administering it, such as the intravenous administration of colloidal bismuth or the intramuscular injection of the salts of bismuth.

9. The addition of bismuth and its salts to the other available methods of treatment does not as yet justify anyone in lessening the length of time over which every case of syphilis should be treated and kept under observation.

10. Apart from cases of intolerance to other drugs, bismuth is only an adjuvant to the treatment of syphilis and should not be used alone, even in the very earliest cases of infection.

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### DISCUSSION.

Dr. J. C. BUCKLEY (Nottingham) considered the introduction of bismuth second in importance only to that of salvarsan. He expressed optimistic views as to the prognosis in early cases of syphilis, and thought that nearly all could be cured by a properly conducted dual therapy. He had found bismuth particularly useful in patients who were intolerant of arsenic, and only in interstitial keratitis was mercury more valuable than bismuth. It was not justifiable to give bismuth alone in early cases of syphilis, but it should be combined with arsenic. The dose he gave

of bismuth was 0.2 gram daily. He asked whether the blue line on the gums, a common concomitant of bismuth therapy, contraindicated the continuance of the treatment.

Dr. MARY MACNICOL (Edinburgh) said that she had been using bismuth now for three years as an adjuvant of arsenic, and thought it more valuable than mercury. In those cases which, although reacting well clinically to arsenical treatment, persisted in giving a positive Wassermann reaction, bismuth had often succeeded in reducing the reaction. She quoted two cases in illustration of this, and referred to its utility in old tertiary cases of gummata. She had found the drug very useful in cases of intolerance to arsenic; and had not met any case intolerant to bismuth, and only one in which there was stomatitis. In congenital cases she had also been able to obtain negative Wassermann reactions. Lately, however, she had found arsenic and mercury better than arsenic and bismuth in very bad congenital syphilis, but bismuth had the great advantage of being painless. She also found it convenient to give arsenic by the mouth during a course of bismuth; it still acted as a tonic and obviated the continual hypodermic injection which many women disliked.

Dr. E. T. BURKE (Manchester) placed bismuth just second to arsenobenzol as an antisyphilitic, but much higher than mercury; he said it must be realized that bismuth was a reinforcement and not a substitute for arsenobenzol. He was in favour of bismuth being given alternately with arsenobenzol—not concurrently. He thought that the experiments of Lehoff-Wyld to show that the therapeutic action of arsenobenzol was enhanced by the presence of another metal in the blood were very unconvincing. Personally he believed that when two highly treponemicidal drugs were used simultaneously either the tissues of the patient would refuse to react properly or the treponema would become resistant. He thought that the practice of concurrent administration was the cause of many persistent positive Wassermann reactions. He was now able to convert many of these into negative reactions by means of potassium iodide followed by metallic bismuth. Arsenic and bismuth might have an actual neutralizing effect on one another. Cases treated with bistovol—a bismuth and arsenic combination—gave extremely disappointing serological results. If, as Kolle held, bismuth merely kept syphilis latent, the concurrent administration of the two elements might be very harmful. Bismuth was particularly useful in syphilitic lesions of the circulatory mechanism; in cases of coronary and aortic disease it was safest to rely on it, possibly to the exclusion of arsenobenzol. In the newly born syphilitic child carrying an enormous burden of treponemata he also began always with bismuth. One of its greatest uses was in interstitial keratitis; he only administered arsenic after the eye condition had cleared up. He thought that the best method of administering the drug was in the metallic form suspended in glucose and injected intramuscularly; the intravenous injection of any bismuth salt was dangerous.

Dr. W. R. SNODGRASS (Glasgow) considered that metallic bismuth in isotonic glucose solution was the most satisfactory preparation. Up to the present the quantity of a standard bismuth preparation necessary to effect and maintain a clinical and serological cure had not been established.

Colonel L. W. HARRISON (London) drew attention to the work of Collard and Evans, who formed a depot of bismuth in a rabbit's ear and then attempted to inoculate it with syphilis. So long as the depot was there no chancre was produced, but as soon as the depot was excised the chancre appeared, showing that the bismuth had only kept the syphilis latent. As regards the effect on the Wassermann reaction he thought there was but little difference between the effect of bismuth in combination with arsenic or mercury in combination with arsenic. He had found bismuth particularly useful in myocarditis, sometimes in conjunction with very small doses of sulfarsenol. The toxic effects of bismuth had not proved very severe, but he had had occasional complaints of rheumatic aches and pains and also of colitis, and he had known dermatitis to be produced.

Dr. STOPFORD TAYLOR (Liverpool) described a severe case of toxic reaction due to bismuth. The patient had suffered from abdominal pain, sickness, diarrhoea, a measly rash, and gingivitis. He also recommended sulfarsenol in very small doses for cardiac cases.

Mr. LEES, in reply, agreed that bismuth alone should not be used in early cases. He did not regard the appearance of the blue line on the gums as a contraindication to the continuance of bismuth, but merely as an indication for dental attention. The principal contraindication to further treatment was loss of weight. Bismuth was exceedingly well tolerated as a rule; unlike mercury it never produced nodules. It was painless, and very useful in cases of parturient women before starting arsenical treatment. It was also particularly useful in cases which were clinically syphilis but serologically negative. He considered that the inunction and oral administration of bismuth were far inferior to injection. He did not agree that the joint and simultaneous administration of arsenic and bismuth and of arsenic and mercury reduced the bodily resistance of patients, though theoretically it might possibly be expected to do so. Myocardial cases, in his opinion, were the only ones in which bismuth should be used alone; in other cardio-vascular patients it should be combined with sulfarsenol. He found it difficult to explain the cases of dermatitis. Some of the cases of gross intolerance he thought might be due to a slight embolism, a small quantity of the metal finding its way into a vein during injection.

## THE EMPLOYMENT OF "POLAR-BODY" DEVELOPING STRAINS OF THE GONOCOCCUS IN TREATMENT OF GONOCOCCAL INFECTION.*

BY

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AND

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FOR the last two years, at the Royal Herbert Hospital, Woolwich, we have been endeavouring to elaborate a line of treatment of gonorrhoea in the male by intensive immunizing methods. Preliminary reports of this work have already appeared in the *British Journal of Venereal Diseases* for January, 1927, and in the *R.A.M.C. Journal* for last March. For the present report we cannot claim any degree of finality; our researches are continuing and our methods constantly changing.

The treatment of gonorrhoea at Woolwich aims at: (1) Raising the immunity of the mucosa through which the organism enters the body. (2) Raising the resistance of the particular glands and organs susceptible to attack by the gonococcus. (3) Raising the antibacterial properties of the blood and tissue fluids in order to minimize the risk of systemic spread of the infection. (4) Bringing the patient under certain precise biochemical and colloid-chemical conditions which have been found to give optimum results as regards defence against the invading organism, and placing the infecting organism under conditions in which it is least able to withstand the defence mechanism of the body. (5) Providing a means of determining whether any local foci of the disease remain or whether the patient is completely freed from the infecting organism—in short, to provide a "test of cure."

These objectives have been sought in the following ways: (1) Thorough drainage of the whole urethra by mild irrigating fluids. (2) The maintenance of the patient's urine reaction at a *p*H of 7.2 to 7.4. (3) The intraurethral instillation of a product of gonococcus metabolism which may be referred to as "exotoxin." (4) The parenteral

* A paper read in opening a discussion on this subject in the Section of Venereal Diseases at the Annual Meeting of the British Medical Association at Edinburgh.

administration of this "exotoxin." (5) The instillation into the urethra of another gonococcus product which we call "endotoxin."

*Drainage.*

The procedure advocated is the posterior irrigation method. The most efficient drainage is obtained by educating patients to irrigate in this way. The irrigating fluid is potassium permanganate (1 in 20,000 strength) which is the least irritating to the urethral mucous membrane. No bactericidal or astringent action is desired. All that we expect from irrigation of the urethra is drainage and cleanliness, and, as a consequence, probably a more intimate and prolonged contact of the intraurethral vaccine preparation with the affected mucous membrane. The results obtained without irrigating methods were poor, and we were compelled to fall back on routine irrigations.

It is not easy to carry out perfect irrigating methods in the acute stages of the disease, but the time and trouble spent in educating patients to irrigate efficiently are well repaid by results, and as our vaccine methods become more efficient, we find that it is only when patients cannot be induced to irrigate efficiently that results are disappointing.

*The Hydrogen-ion Concentration of the Urine.*

The body's optimum response to the attack of the gonococcus occurs when the hydrogen-ion concentration of the urine is within the limits of *p*H 7.2 to 7.4. Within these limits phagocytosis is at its maximum and the gonococcus is least favourably placed to withstand the attack of the body cells and fluids. Below this reaction on the acid side conditions favour the gonococcus; phagocytosis is at a minimum, and the invading organism, surrounded by a tough capsule of sclero-protein, is in its most resistant form.

With an alkaline reaction there is a tendency to autolysis of the gonococcus with liberation of toxic "endotoxin," which has an irritating and provocative effect on the body. In practice we endeavour to bring the patient into this optimum state by administration of comparatively enormous doses of disodium monohydrogen phosphate by the mouth. Our dosage amounts to 240 grains four times a day. Even in such large doses it is extremely difficult to maintain the desired reaction, especially at the stage of the disease when the diet tends to be more generous. The reaction is determined roughly by daily urine titrations; thus, to 1 c.cm. of urine add a drop of phenol red solution —a pink colour indicates a *p*H of 7.2 to 7.4 approximately.

Other alkalis have been tried, but for one reason or another have been abandoned; for example, sodium bicarbonate raises the $CO_2$ content in the tissues, and $CO_2$ is a gonococcus growth stimulant. We thought there might be an appreciable danger of overalkalinization with lysis of the gonococcus in the urethra and consequent elaboration of toxic endotoxin, but we believe now, on clinical grounds at least, that the danger is exaggerated and that a very alkaline reaction, which is almost invariably temporary, is of little consequence.

*Gonococcal Exotoxin.*

By special cultural methods it was found by Major Dimond that, when gonococci are grown on a medium rich in animal nucleo-protein, approximately one-third of the isolated strains develop polar bodies (Babès's bodies), which can be demonstrated histologically by staining methods identical with those employed in the demonstration of the polar bodies in *Bacillus diphtheriae*. The polar bodies are composed of alpha-nucleo-protein and beta-nucleo-histone. They are only loosely attached to the bodies of the gonococci, and can be separated easily from these by washing off the culture with 2 per cent. saline solution and fractionally centrifugalizing the emulsion, or by means of gravity; the polar bodies are then found in the supernatant fluid. Since the 2 per cent. saline solution dissolves the beta-nucleo-histone, the solid elements in the supernatant fluid are the alpha-nucleo-protein fraction of the polar bodies. Clinical experiments have shown that both the alpha-nucleo-protein and beta-nucleo-histone are antigenic (the beta-nucleo-histone more so than the alpha-nucleo-protein) and relatively non-toxic.

Human serum we have found to be the best vehicle for the separation of the polar bodies from the gonococci, as by this means the polar bodies are retained intact, and clinically the best results have been obtained by using the serum washes. However, serum has at least two serious disadvantages: an adequate supply is difficult to maintain, and the question of keeping the emulsion sterile for universal use has not yet been satisfactorily accomplished, although experiments are in progress to test the value of the addition of weak antiseptics, both as regards maintaining sterility and as regards the effect, if any, on the antigenicity of the emulsion. Substitutes for serum, such as Ringer's solution, have been found useless for the purpose.

The employment of 2 per cent. saline solution is not altogether a perfect method for the separation of the polar bodies. The beta-nucleo-histone is in solution and the alpha-nucleo-protein in suspension, but on separating the supernatant fluid from the bodies of the gonococci much of the alpha-nucleo-protein is lost, as it is unwise to pipette too close to the bodies of the gonococci lest large numbers of them be included in the product. It has been found clinically that there is a definite provocative effect if gonococci are included. So that the use of 2 per cent. saline by itself results in much loss of what we consider to be the true gonococcus antigen—namely, the polar bodies or their product.

Recently it has been found that if the *p*H of the 2 per cent. saline during the process of gravitation be kept at 7.2 the alpha-nucleo-protein fraction is kept in suspension much longer, and at the end of twenty-four hours the deposit of this fraction on the bodies of the gonococci is very appreciably diminished, the supernatant fluid in consequence being richer in antigenic substances. This same observation as regards reaction applies to the serum washes of polar bodies—they remain very appreciably longer in suspension.

For intraurethral use the 2 per cent. saline or serum washes are standardized so that the nucleo-protein of 500,000 million organisms is contained in 15 c.cm. Larger doses than this can be given without any signs of provocation and with even better results, but as polar-body producing growths on nucleic acid media are never luxuriant, there is a limit to the number of culture tubes which can be dealt with in the conditions under which we work. To this 15 c.cm. of 2 per cent. saline—representing, say, the product of 500,000 million gonococci—is added 5 per cent. sodium taurocholate and the reaction brought to a *p*H of 7.2.

Most samples of sodium taurocholate are acid and cause great irritation; the only preparation of sodium taurocholate which we have found to comply with our requirements is that produced by Fairchild. To this mixture of taurocholate and polar body emulsion we add umbilical cord mucin 1 per cent. up to 100 c.cm. The dose is 20 c.cm. intraurethrally, representing the product of 100,000 million gonococci. Formerly we had hoped that commercial mucin might be used as a substitute for the umbilical cord mucin, but, unfortunately, all the subsequent samples we obtained were adulterated, and did not represent true mucin, and the results were irritative.

For intradermal, subcutaneous, and intramuscular administration we use the same serum or 2 per cent. salt emulsion of polar bodies or their products, but standardized to represent 1,000 million per c.cm.

*Instillation of Endotoxin.*

For the preparation of endotoxin we have used strains which do not throw out the polar bodies employed in the exotoxin preparations. These strains comprise roughly 66 per cent of those isolated. They are grown for ten days on a special alkaline autolysate of ox heart. The culture is washed off and, after being repeatedly frozen and thawed, yields a product of albumoses in a blue opalescent solution. It is made up to a strength representing the product of 250 million gonococci in 1 c.cm., the diluent being chemically prepared colloidal silver. The effect of an intraurethral injection of this preparation in a quiescent gonococcus carrier is to produce a temporary activity with the appearance of gonococci in the urethral discharge.

This product, which we believe to contain the true toxic elements of the gonococcus, is the original gonococcus product which has been employed for over four years as a "test of cure" both at Woolwich and at other military hospitals; to Major A. T. Frost, R.A.M.C., is due the credit of conceiving the possibilities of an efficient "test of cure," and of encouraging by his advice the manufacture of this product.

The provocative effect may be observed as early as twelve hours, or may be delayed several days, sometimes a week, and to cover all cases we keep the patient under observation for seven days after an endotoxin instillation before we pronounce him free from active signs. We have comparatively recently put up this "endotoxin" preparation in weaker strength—for example, 1 c.cm., to represent 50 million of the organism—and employed it as an intraurethral instillation much earlier in the course of the disease as a mild provocative in certain cases. This introduction of the provocative products of the gonococcus at an early stage was at the suggestion of Colonel Harrison, the idea being mildly to provoke infected urethral foci, which appeared on clinical grounds to be developing into indolent and probably latent foci.

To summarize our methods:

1. We bring the patient's urine and tissues to what we conceive to be the optimum *p*H reaction.
2. We attempt local immunization by the intraurethral instillation of exotoxin (gonococcal) in mucin.
3. An effort is made to raise the general immunity response by the parenteral administration of gonococcal exotoxin vaccine.
4. Endotoxin is injected into the urethra as a "test of cure," and in certain cases to stimulate a reaction in the course of treatment.

### *The Clinical Application.*

As regards general treatment, all our patients in the army are treated in hospital, and for the first fourteen days are confined to bed on a low diet. At the end of that period they are allowed "up" and given fish diet, and graduated exercises are permitted; these latter are not special exercises, but comprise the ordinary hospital fatigues, which vary from quite light duties to comparatively heavy work.

Urethral smears are taken and examined microscopically daily, and a rough daily estimation of urine *p*H value is made. Immediately the case is diagnosed routine local treatment is commenced; this consists of an irrigation, followed by an intraurethral exotoxin instillation, which the patient retains in the bladder and urethra for as long as possible—three hours or more. At the same time he receives an intradermal injection of exotoxin vaccine into the skin of the shaft of the penis, and an intramuscular injection of the same vaccine at any convenient site.

As regards the intraurethral instillation, this is repeated as soon as the urine *p*H becomes optimum, and subsequently whenever urethral smears show the presence of gonococci throughout the course of the disease. This instillation causes no irritation or provocative effect, and in practice it can be repeated whenever an antigenic or ameliorative action is desired. As regards the intradermal injection, this route and site are chosen with the object of stimulating the local reticulo-endothelial system, in which immune bodies are manufactured. The administration at this site causes a slight local reaction and a definite temporary tenderness of the lymph glands of the groin. The intramuscular injection causes only the slightest local reaction.

The two initial doses by the intradermal and intramuscular routes are 0.2 c.cm.=200 million respectively. In the average case they are repeated at ten-day intervals, the intradermal dose remaining the same, but the intramuscular doses are gradually increased. Every case is treated on its own merits as regards intervals and dosage; many cases can be given larger doses at shorter intervals.

When, on clinical grounds, the course of events justifies the consideration of cure, the patient receives an intraurethral injection of endotoxin, the dose being 1 c.cm=250 million. This is to provoke into activity any latent active foci. If following this provocative injection the case relapses, treatment with exotoxin intraurethrally is repeated. Should there be no recrudescence after seven days' observation the patient leaves the hospital; there have been very few subsequent relapses.

For a long time we had observed that although there might be an immediate recrudescence of the disease following an endotoxin injection as a "test of cure," the subsequent course of events was good. When this "flare up" of the disease had settled down the case went on to recovery, and subsequent endotoxin injections failed to provoke a relapse. This induced us to try the effect of endotoxin locally in its original strength at an earlier stage of the disease; but the results were not good; there was severe provocation in the average case, and there followed what appeared to be a prolonged "negative phase."

Latterly we have reduced the strength of endotoxin for special use in treatment to 1 c.cm=50 million, and to distinguish it from the original product used as the "test of cure" we have called it "treatment endotoxin." Thus, by reducing the dose, we can employ it much earlier in the course of the disease as a mild provocative. For example, quite a fair proportion of cases are apparently cured clinically after one or two initial instillations of exotoxin. These cases often progress until the third week without any active signs, when they relapse with a "gleet" showing gonococci occasionally. They may go on in this state indefinitely, the origin of the trouble being a few local submucous foci which have become indolent and resistant. The instillation of the "treatment endotoxin" at an earlier stage would appear to be of use as a mild provocative of such indolent foci, and this specific stimulation gives the necessary fillip to complete their cure.

Although we believe that endotoxin contains the true toxic derivatives of gonococcal metabolism, there is no doubt that clinical experiences point to the fact that it also possesses antigenic properties when administered in correct dosage and at the right time in the course of the disease. Major A. T. Frost, R.A.M.C., observed this clinical fact in the early days when Major Dimond first produced endotoxin, but we have been inclined to forget it in our enthusiasm to produce a non-toxic exotoxin.

### *Deductions and Results of Treatment.*

Except in a general way we do not venture, at this stage, to claim that in employing these methods for the treatment of gonorrhoea we have elaborated a perfect line of treatment, or even that we have very appreciably decreased the duration of the disease. We feel that in attacking gonorrhoea by these special polar-body-producing vaccines we have accidentally tackled the most difficult disease in which to apply these methods. The gonococcus is notoriously a toxic organism, and the anatomy of gonorrhoea is exceptionally difficult.

Another unfortunate fact was the elaboration of endotoxin—our "test of cure"—before the production of the non-toxic exotoxin. By applying endotoxin as our "test of cure" our standard of cure is exceedingly high—in the opinion of many, too high. Certainly patients are kept in hospital when to all intents and purposes they are clinically cured, for they are incapable of being provoked to relapse by any other method than by endotoxin. If we had not employed endotoxin we might have produced some excellent statistics as to days under treatment. However, we are conscious that there has been a general all-round improvement clinically: complications are comparatively rare, and the relapse incidence is lower than it has ever been. The most striking feature is the great diminution of the urethral discharge with corresponding decrease in the number of gonococci in the films after an intraurethral instillation of exotoxin. In an early acute case, with all essentials at an optimum, such as the *p*H reaction and efficient irrigation, the sequel of events is dramatic. Naturally such happy results are not frequent, but they occur sufficiently often to convince even the sceptic that their occurrence is no mere coincidence.

All of us who have followed this research from the beginning feel that we have not yet perfected our methods of application and that we are not getting the optimum of results which we are so confident are to be obtained. As regards the exotoxic vaccine used parenterally, its anti-

genic value is high, it is non-toxic, and has given very good results in many severe cases of local and metastatic complications.

*Polar Body Production in Organisms other than the Gonococcus.*

Although perhaps outside the question under review the following general remarks may be of interest by way of confirmation.

Polar bodies, which we have been able to obtain in 33 per cent. of all gonococcus strains—provided the necessary elements for their formation are present in the culture medium and the physical conditions required for their development are maintained—have also been found to develop in a certain percentage of strains of every organism investigated up to the present. For example, this development has been observed in strains of *B. tuberculosis* (bovine), staphylococci, streptococci, pneumococci, Friedländer's bacillus, *B. coli*, *B. catarrhalis*, *B. crassus*, *B. influenzae* (Pfeiffer), *B. septus*, Hoffmann's bacillus, *B. xerosis*, etc.

In the case of the above, with the solitary exception of *B. coli*, a very large percentage of the strains show this development. In the case of the true *B. diphtheriae*, this organism, as is well known, develops polar bodies on Loeffler's medium, and when subcultured upon nucleo-protein media shows a remarkably increased production of polar bodies.

Of interest is the culture of true Klebs-Loeffler bacilli upon Dorset's egg medium; the primary culture invariably shows a certain number of elements containing polar bodies, apparently due to the carrying over to the medium of nucleo-proteins derived from the leucocytes and cells of the membrane. In the second, third, and fourth subcultures, however, no polar bodies are developed. However, if such a non-polar body culture of Klebs-Loeffler bacilli from the third or fourth Dorset medium subculture be transferred to a nucleo-protein media an immediate and enormous development of polar bodies can be observed as early as the seventh to eighth hour of culture.

As in the case of the gonococcus, if vaccines have been cultured upon media providing for detoxication during the period of subculture, and if means are taken during the process of manufacture of the vaccine to prevent further development of toxin, it is noteworthy that there is a complete absence of negative phase following the administration of such vaccine, as compared with the marked negative phase resulting from vaccines prepared from non-polar-body-producing strains. For example, polar body strains of *M. catarrhalis* sterilized by means of 0.5 per cent. phenol cause an immediate positive phase and amelioration of symptoms in *M. catarrhalis* infections. On the other hand, if such vaccines are heated at 60° C., though a favourable antigenic action is ultimately obtained, there is a definite negative phase, apparently due to the liberation of some toxin by the action of heat. The same effects are seen following the employment of gonococcus vaccines both locally and parenterally.

In tuberculosis *B. tuberculosis* will probably be of value when cultured and detoxicated with the development of polar bodies. A bovine strain of tubercle bacilli with abundant polar body production, brought about marked clinical improvement in a case of pulmonary haemorrhage, and with no evidence of negative phase.

Observation of the serum ferments in the mononuclear digestion of a polymorph leucocyte shows the following invariable time reactions. The cytoplasm of the cell is first digested, leaving the nuclear lobes free in the cytoplasm of the mononuclear, the nuclear reticulum disappears and the lobes are stained a uniform blue. Subsequently the nuclear lobes gradually become smaller and smaller until completely dissolved by the cytases of the reticulo-endothelial cell vacuole.

Precisely similar is the course of events in the case of the polymorphonuclear leucocyte laden with polar-body-containing gonococci, here the cytoplasm of the polymorph cell and that of the gonococcus first disappears, leaving the nuclear lobes and polar body granules free in the mononuclear cytoplasm. Subsequently these disappear at a much later period.

It is possible that in the above phenomena we have an explanation of the positive and negative phases resulting from vaccine administration—the negative phase being due to the liberating of endotoxin from the early digestion of the cytoplasm of the organism, whereas the positive phase may occur later as a result of the liberation of the antigenic complexes present in the polar body fraction of the organism.

If this explanation is a true one, the negative phase as a result of vaccine administration does not appear to be necessary to the development of the ameliorative positive phase—this being confirmed by the fact that it is possible with properly detoxicated polar-body-producing strains of all organisms to bring about immediate positive phases with clinical improvement.

This has been our experience after eighteen months' employment of this toxin-free gonococcus vaccine, provided every precaution is taken against the elaboration of endotoxin during manufacture. In a certain number of cases when, for experimental reasons, various modifications in the technique of culture and preparation have resulted in the causation of a negative phase, this has invariably been found to be the result of the presence of endotoxin caused by faulty methods of manufacture.

DISCUSSION.

Colonel HARRISON said he had always thought that these variations in potency were due to differences in the strains of gonococci employed to make the vaccine, and he had also hoped that perhaps by means of special cultural methods the antigenic properties of the vaccine might be enhanced. He had had some of the new vaccine satisfactorily prepared and tested at St. Thomas's Hospital. So far as could be ascertained from investigation of only a few cases by Dr. Oliver, utilizing the complement fixation test they had established that the polar body vaccine was of definite value in raising the production of antigen. Clinically they had had one brilliant result—an absolute cure in three days after one injection, notwithstanding the most vigorous efforts to excite a relapse. Other cases had cleared up more quickly than usual but had then relapsed. He asked, Why should the vaccine-producing body be called exotoxin when it was not toxic?

The PRESIDENT believed that the authors had opened up a subject which might eventually yield important results in the treatment of gonococcal infections, and also produce an explanation of the discrepancies known to all who had used vaccines for gonorrhoea and other infections. There was a large field for reliable vaccine therapy in the treatment of female gonorrhoea.

Major LAMBKIN, in reply, said that the term "endotoxin" was scientifically correct, as the substance was the product of the disintegration of the gonococcus. The term exotoxin was more debatable, since it was doubtful whether the substance was a true toxin, but it was difficult to find a more appropriate and descriptive name.

## WORLD EPIDEMICS AND THEIR RELATIONSHIP AS CAUSE AND EFFECT TO SOCIAL CONDITIONS.*

BY

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ONE who speaks with authority has told us that—

"There are nine-and-forty ways of constructing Tribal lays,
And every single one of them is right."

Much the same might be said with regard to history, only the number of methods would require to be indefinitely extended, since almost every historian has his own views of the manner in which it should be written, and there is scarcely a philosopher, from Aristotle onwards, who has not tried to show the professed historian how his work should be done. The reader of history, therefore, comes under a spell of infinite variety. In one volume he will

* A paper communicated to the Section of the History of Medicine at the Annual Meeting of the British Medical Association, Edinburgh, July, 1927.

find the doings and sayings of the kings minutely recorded, while his next author will write as if the various statutes were the only things worth remembrance. After that he may meet the historian whose pen will scarce waste a drop of ink on these things, but acts on Johnson's words:

> "How small of all that human hearts endure,
> That part which law or kings can cause or cure."

History, of course, has only too often been perverted to the purpose of the pure partisan or propagandist; but with all this variety of point of view it is at least curious that the influence of disease on the history of a nation or people has been almost entirely overlooked. No one can deny that ill health very greatly affects the individual and may make or mar his life work, but the biographer also for the most part minimizes or misses its significance.

Nor can it be said that the medical man turned biographer has been much more successful. The reason for that perhaps lies in the fact that he was not so much writing a biography as proving a thesis. In one such book, if I remember rightly, the author showed to his own satisfaction that all his subjects suffered from eye-strain or had errors of astigmatism. In another the remarkable men and women whose lives were sketched were proved to have been insane. I need only say a word in passing as to the efforts of the psycho-analysts in this direction; they have at least succeeded in adding a new terror to death.

It is true, indeed, that almost every history records such dramatic events as when

> "The Angel of Death spread his wings to the blast
> And breathed in the face of the foe as he passed";

so that a siege was suddenly raised or a hostile army rapidly destroyed. But it is no less true that the remote and less obvious consequences of terrible and world-wide epidemics have failed to gain recognition. Thus Hume only devotes one short paragraph of sixteen lines to the Black Death, and seems to have been prompted to mention it merely because it interrupted the festivities held to celebrate Edward's victories on the Continent, and because it prolonged the truce entered into between him and the King of France. It is still more strange to find Green, whose ideas as to the proper subject matter of history were so different from those of Hume, failing to notice the awful aftermath of that pestilence. Fortunately the term of this neglect has now passed, and we stand in the dawn of a new day, of the brightness of which there is an excellent augury in the book of W. H. S. Jones, *Malaria and Greek History*. The reason for this welcome change is to be found in the interest recently awakened in the medical mind as to the story of medicine in bygone ages. To-day for the first time the British Medical Association has assigned a special Section at the Annual Meeting to the history of medicine, and this is in itself a testimony to the widespread interest in the subject and an acknowledgement of its importance.

The theme allotted to me is manifestly too wide to be developed adequately in the time at my disposal, even if I had the competent knowledge to do so. As it is denied to me to enter the promised land, I esteem it a privilege to have even a glimpse of it from my lowly Pisgah, and I shall be happy if I may rightly discern the lines along which others may be able to enter into possession.

Let me, then, direct attention to three dates: 430 B.C., A.D. 542, and A.D. 1348—periods when Death held such high carnival throughout the world that the survivors thought it a miracle to find themselves alive. Now if the mind be cast back to the century which followed each of these dates, it will be found to be marked by events of world-wide importance. In 430 B.C. Greece was at the height of its power, but one hundred years later it had fallen before barbarous Macedon, and Alexander had pushed his conquests from Egypt to India. In A.D. 542 Justinian at Constantinople and Chosroes in Persia were each at the head of a long established and stable empire, and yet within a century the Arabs had set out on a career of conquest that wiped the empire of Persia off the map, and deprived the Byzantine ruler of half his dominions. Then in 1358, ten years after the Black Death, a fresh race of barbarians, the Turks, first set foot in Europe, at Gallipoli, that shrine of dolorous memory to all of British blood, and passed from victory to victory till in 1453 the Byzantine empire was numbered with the things of the past.

It may be said that these are merely curious coincidences and nothing more, that the immediately preceding circumstances brought these events about, and that the direct effects of the pestilence had worn themselves out long before. It may be so, but the matter seems well worth more careful investigation. However widespread the pestilence there must have been some inequalities in its distribution, and in general its destructive powers must have been greater in the closely packed towns than in the more widely spread population of the country. We certainly know that the popular method of trying to avoid contagion was for the citizens to fly to rural districts. Other things being equal, then, the direful effects of plague must have been much heavier in civilized communities than among barbarians, for the city is the symbol of civilization. For these and many other reasons I believe that there is real ground for thinking that it was pestilence that gave the Macedonian, the Arab, and the Turk the first push on the road to power and empire.

This idea is greatly strengthened if we consider in a little more detail what happened after the Black Death. We know that the cities suffered so much from the loss of citizens that various means were adopted to attract fresh inhabitants. These efforts were successful through the rapid influx of people from the country. As a result, and because of the lessened power of the nobles owing to the drain of their rural retainers, the cities rose in power and influence. Thus we find that by the treaty of Stralsund in 1371 the Hansa League of towns entered upon its period of greatest prosperity.

The weakened power of the nobles led to the downfall of the feudal system, which was the mainstay of the lords and barons; its end was hastened by the protection given by the kings to the towns. By the gradual absorption of fiefs the power of the king waxed stronger and stronger, till by the end of the fifteenth century all the land became vested in him alone, and the kings of England, France, and Spain became absolute monarchs. This trend towards concentration of sovereignty had already been manifested in 1397 in the treaty of Kalmar, which brought Norway, Sweden, and Denmark under one crown.

The indiscriminate visitation by death of the castle and the hovel gave a fearful object lesson of the essential equality of man. When the corpse of the lord was dragged in the same tumbrel as that of the labourer and both were cast into the same trench, it was inevitable that the question should be asked why it should be the privilege of the one to have power and wealth, while the lot of the other should be poverty and labour. In England it found popular expression in the refrain,

> "When Adam delved and Eve span,
> Who was then the gentleman?"

Besides, owing to the lack of labour, the peasant found himself to be a person of importance in the State. Land had to be tilled if the nation was to escape starvation, so that landowners competed with one another in offers of wages for labour. Parliament stepped in with ineffectual laws to try and fix wages or to prevent the labourer leaving the land. And so came the insurrection of the peasants of England, which had already been preceded by a similar movement in France—the "Jacquerie." It was thus the pestilence which first enlisted the labourers against the army of capitalism.

It is to this period also that we must assign the real beginning of the middle classes. Naturally the citizens were the begetters of the prosperity of the towns, and the riches and power of the towns were reflected in the affluence and influence of the burgesses. In the order of things the accumulation of wealth is gradual, but the great mortality brought undreamt-of riches into unaccustomed hands, which as rapidly dissipated the money in reckless prodigality. Such people thought of nothing but rich clothing, sumptuous feasts, and generally riotous living. Many social customs were changed. The cloak was cut down into a garment which only reached the knee and was still further abbreviated, and as it now closely fitted to the body it was no

longer drawn over the head, but was left open in front and fastened with buttons. The indecency of this new fashion, the jacket, was the theme of many homilies.

In no direction, perhaps, did the Black Death make greater havoc than in regard to religion. To some the mortality brought a greater sense of their own sinfulness and the need of a greater dependence on Divine providence. But even the devotions that were the consequence of this feeling were of a different character from those previously followed. Such people still kept within the line of orthodoxy, but there were many others to whom the extraordinary fatality among the priesthood brought other thoughts. To them it was a sign of God's judgement upon the wickedness of the clergy, else why should they have been cut off? Thus Wyclif taught that only those priests who were in a state of grace could properly administer the sacraments. So many parishes were left destitute of incumbents that the faithful became accustomed to the absence of these spiritual directors and began to fend for themselves. From this time we can trace the growth of a somewhat Presbyterian cast of thought. It is significant that the flagellants were almost all lay people, and that priests or religious when present did not direct the proceedings. The efforts to make good the depleted ranks of the clergy and to fill up the vacant places in the monasteries were far from attaining success. The ranks were to some extent made up and places filled, but in too many instances the hasty selection of unsuitable recruits and the inadequate training to which they were submitted gave to the lay people pastors quite unfitted to discharge their duties adequately. It is abundantly clear, indeed, that with the harvest of death there was a widespread sowing of the dragons' teeth, which were to grow up in due time into an army of revolt against the authority of the Church of Rome. Luther merely applied the torch; the Black Death had already assembled the faggots.

The moral and religious effects that follow the contemplation of death on a great scale may be noted even in our own time. Four years of war on a scale unparalleled in history, followed by an epidemic which, perhaps, cut off even more than the war, may give us some faint idea of what happened during the Black Death. As then, so now, the moralists insist on the increased selfishness of mankind, the blunting of religious feeling, the inordinate pursuit of pleasure, the new mania for dancing, the immodesty of conduct and of garments. It is no part of my duty to inquire to what extent these complaints are justified. I merely note that the symptoms are similar, and the resemblances might be greatly multiplied. It was in a time of pestilence that Max Augustin, a singer and bagpipe player of Vienna, composed his well known song. Is it a further coincidence that his tune has received a new consecration in the froth-blowers' anthem?

# Memoranda:

## MEDICAL, SURGICAL, OBSTETRICAL.

### TREATMENT OF VARICOSE VEINS BY INJECTION.

THE inquiry of Major-General T. M. Corker in your issue of August 6th (p. 244) leads me to send a brief report of my own experience during the last six months in the treatment of varicose veins by injection. The number of cases treated is small, and too short a time has expired to allow me to judge the permanence of the results obtained, so I do not wish to pronounce a final opinion at present.

Of six cases which have been completed recently, two had very large and extensive varicosity in the veins of both legs, two were early cases, and two were of long standing but not extensive, only one limb being affected. Sodium salicylate solutions in 20 and 30 per cent. strengths have been used, because these can be prepared and sterilized at home, and the patients have attended at my house for treatment. The two severe cases have had many injections, have felt very little pain, and have shown no evidence of spreading thrombosis. On the other hand, relief was felt after the first treatment. Both patients have discarded bandages and elastic stockings worn for many years, and they appear quite satisfied with the results.

Of the slighter cases one was cured by two treatments of seven punctures altogether; one patient who was extremely nervous did not take kindly to the injections and they were discontinued, so I should consider this case a failure; a third had much pain, and after her second treatment showed signs of phlebitis extending down towards the ankle, not upwards; the veins are smaller, and I am hoping for a cure. The fourth had developed varicose veins in the right leg during pregnancy; the veins were getting bigger quickly, and she complained of increasing pain. Two treatments, of three injections each, were given with one week's interval; the pain was relieved, and the veins in the leg became smaller and quite hard. About the same time I attended another lady who had developed varix of the internal saphena during pregnancy. No treatment was given, and I was interested to find, a few days after delivery, that the vein had become thrombosed from the saphenous opening downwards for about four inches—evidently a natural cure, by a process similar to that which follows injection.

Up to the present I have followed the instructions given by Professor Sicard[1] and Dr. Meisen.[2] I have seen no sign of danger from thrombosis, and no sloughing of skin from escape of the injected fluid into the tissues. A fine sharp needle and a little neatness in manipulation are needed, and, of course, surgical cleanliness. An expensive outfit is not required.

This method of treatment is to be recommended for true varicose veins, but should not be used for patients with dilated superficial veins following "white leg."

Saffron Walden. F. ARTHUR HEPWORTH, M.B., Ch.B.

### ACUTE APPENDICITIS IN AN INFANT.

INSTANCES of the vermiform appendix being found in a hernial sac have been recorded in the JOURNAL from time to time,[3] but the unusual history and features of the following case make it worthy of record:

In September, 1924, a male infant, aged 3 weeks, was admitted to the Royal Manchester Children's Hospital with five days' history of progressive swelling and inflammation of the penis and scrotum, more marked on the right side; the scrotum formed a reddened, tense, inflamed mass about 3 inches in diameter. The temperature was 102.2°, and the pulse 170 (approximately).

A provisional diagnosis of acute orchitis was made, and incision and drainage of the abscess in the scrotum brought immediate relief. The temperature subsided slowly during the ensuing three weeks and drainage ceased in another two weeks, when the infant was discharged home in good health, having gained 1½ lb. in weight during convalescence.

Two years later the same child was brought back to hospital for further treatment. A discharging sinus had formed in the scrotum shortly after his return home and had persisted, and a rupture had been present on the right side since the operation and was becoming increasingly evident and troublesome. A typical right scrotal hernia could be partially but not wholly reduced, and a small indurated sinus was present on the anterior aspect of the right side of the scrotum from which a clear glairy bead of discharge could be expressed.

An operation for radical cure of the hernia was performed by Mr. A. H. Southam on September 1st, 1926. A large sliding scrotal hernia was found containing the distal four inches of ileum, together with the caecum, and appendix, and the first part of the ascending colon. The appendix appeared thickened, and was adherent by its tip to the sinus, with which the continuity of its lumen could be demonstrated. The testis was normal and showed no evidence of old inflammation. Appendicectomy and radical cure were performed, and an uninterrupted recovery with complete closure of the sinus resulted.

It appeared evident that the previous trouble had originated as an attack of acute appendicitis in the hernial sac in the scrotum, a condition which must be unusual at so early an age, and which had resulted in the formation of a "pathological appendicostomy."

I am indebted to Mr. A. H. Southam, under whose care the boy came, for permission to place this case on record.

SAMUEL POPE, M.B., Ch.B.,
Late Resident Surgical Officer, Royal Manchester Children's Hospital.

Alderley Edge, Cheshire.

[1] *La Presse Médicale*, June 2nd, 1926.
[2] *Acta Chirurgica Scandinavica*, June 30th, 1926.
[3] BRITISH MEDICAL JOURNAL, February 27th, 1926, p. 373; March 20th, 1926, p. 528; June 4th, 1927, p. 1005.

### THE SYMPATHETIC SYSTEM IN MINERS' NYSTAGMUS.

MANY cases of miners' nystagmus pass through my hands, and I have examined the pupil with great care. Apparently there is no dilatation. This answers Dr. Baldwin's question (July 30th, p. 191). The chief symptoms of the disease, however, might well be due to hypertonicity of the sympathetic nervous system, and the conditions under which a miner works certainly involve overaction of this system—for example, the maintenance of unnatural posture and a fully dilated pupil.

It appears to be fairly well established that miners' nystagmus is associated with lack of light. There is considerable evidence, from work done at Jesionek's clinic at Giessen, that ultra-violet light has a definite effect on the sympathetic nerve endings. Also in Raynaud's disease good results have been obtained by treatment with ultra-violet light, and this is said to be due to indirect action through the sympathetic nerves.

It seems possible, therefore, that a considerable deprivation of actinic light during a man's employment as a miner, combined with the extra call upon the sympathetic nervous system due to unnatural posture and dilated pupil, may bring about a more or less permanent condition of sympathetic hypertonicity. Such sympathetic hypertonicity might account for all the symptoms of miners' nystagmus—tachycardia, disordered tone of the eye muscles (clonus?), sweating, psycho-neurotic changes, etc.

This suggestion is merely tentative and naturally can only be expressed in outline here, but the chain of evidence is so strong that it seems worth while to test the effect of actinic light upon patients suffering from miners' nystagmus. For some time past I have been investigating this matter, and arrangements have been made for me to test the treatment.

Wrexham. RAYMOND S. BROCK, M.B., Ch.B.

### COINS IN THE OESOPHAGUS.

MR. KENNETH LEES's memorandum on coins in the oesophagus (April 23rd, p. 761) recalls to my mind an interesting case of the same kind which came under my care when casualty house-surgeon in 1916 at St. Mary's Hospital.

A boy, aged about 9 years, was brought to the casualty department with the history that he had swallowed a halfpenny a fortnight previously, and that it had not been passed by the bowel. *X*-ray examination at the hospital showed the halfpenny fixed at the cardiac end of the oesophagus. It was decided to attempt to recover it with a coin-catcher.

The boy was anaesthetized in the *x*-ray room and the coin located by the *x* rays. By gently insinuating the coin-catcher into the oesophagus until it reached the level of the coin, I managed, with much difficulty, to grip the halfpenny with the teeth of the instrument, and pulled it up gently to the boy's mouth. The grip on the coin was now relaxed, but the boy gulped suddenly and swallowed the coin again.

The entire procedure had to be repeated, for the coin had reached the same level in the gullet as when first swallowed. Before the second attempt was made it occurred to me that it might be easier to push the coin from the oesophagus into the stomach, but a second attempt finally recovered the halfpenny.

The case is worthy of record because it shows that a small coin does not always pass from the oesophagus into the bowel with ease.

T. STENNER EVANS, M.B., B.S.Lond.

Fochriw, Glamorgan.

## Reports of Societies.

### SPONTANEOUS RUPTURE OF THE UTERUS.

AT a meeting of the Edinburgh Obstetrical Society, on June 28th, with Professor JOHNSTONE, the President, in the chair, Professor JAMES HENDRY (Glasgow) read a paper on spontaneous rupture of the uterus before or during labour.

Professor HENDRY described four cases of spontaneous rupture which had recently come under his care in Glasgow, and referred to 54 other cases which he had extracted from the literature since January 1st, 1926. He said that it was impossible to ascribe rupture to one cause only. In 21 cases it had followed a previous Caesarean section, and in two of these the lower uterine segment incision had been used, 16 of the ruptures having occurred during pregnancy and only seven during labour. It would seem from the Statistics that induction of labour after a previous Caesarean section was liable to cause rupture. In one of Professor Hendry's cases rupture had occurred through the whole length of a previous Caesarean section scar. In 10 other cases rupture had followed some previous intrauterine manipulation such as manual removal of the placenta at a previous confinement. No case of rupture following a myomectomy was noted in the series. In one of Professor Hendry's patients rupture was associated with a deep tear of the cervix which had occurred at a previous labour. In four cases pituitary extract was regarded as a causal factor, though many French and Spanish obstetricians had reported no cases of rupture following the use of pituitary. In five cases prolonged labour due to various abnormalities was cited as the cause of rupture. In two of Professor Hendry's cases the presentation was a brow in one and an occipito-posterior in the other, which he considered etiological factors in the rupture. No patient had shown the usual classical symptoms of rupture, and in one instance there were practically no symptoms, the rupture being diagnosed by the distinct feeling of the foetus and the inability to produce any response of contraction of the uterine wall over the foetus. To this type Professor Hendry ascribed the name "silent rupture," and said that its recognition was extremely difficult. With regard to diagnosis he laid special stress on the easy palpation of the foetal parts and the inability to get the uterus to contract over them by gentle massage. Another important sign was the recession of the presenting part from its position in the pelvic brim which occurred in two of Professor Hendry's patients; the amount of blood lost either intra-abdominally or externally was always very little and did not exceed six to eight ounces. All his patients had been treated by supravaginal hysterectomy with invariably good results.

*Therapeutic Abortion.*

Dr. H. S. DAVIDSON read a paper on therapeutic abortion with special methods of induction, with particular reference to cases in which abortion had been induced either at the Royal Maternity Hospital, Edinburgh, or in his own private practice since 1923. The first reason for induction which he discussed was hyperemesis gravidarum, in which he thought that induction should be performed if the pulse rate was consistently over 100 for forty-eight hours. It was shown from his own results compared with those of the hospital that the earlier the induction after this forty-eight hours the better it was for the patient, there having been no mortality in any of Dr. Davidson's patients. He also laid stress on the importance of jaundice as a bad prognostic sign, but he considered the state of the myocardium was much more important than the state of the liver with regard to mortality. He then discussed heart disease and phthisis in pregnancy, and stated that in some of these cases abortion had to be induced. Albuminuria, sleepy sickness, and mental conditions were also discussed with regard to induction of abortion. Dr. Davidson divided the methods employed into the slow and the rapid. In the former dilatation and packing of the uterus with gauze either with or without destroying the ovum was considered the simplest procedure; the abortion might be expected to occur in from three to five days' time. This method was considered eminently suitable in cases where no haste was required. Induction by means of tents was a useful method when the uterus had to be cleared out within forty-eight hours at the most. Of the rapid methods vaginal hysterotomy was said to be suitable only in multiparous patients. Dr. Davidson had performed abdominal hysterotomy in several cases with excellent results. The operation was easy, and the amount of shock was less than in the case of vaginal hysterotomy. It was the operation of election when sterilization had to be effected at the same time, and it would seem to be a very useful method in cases of hydatid mole, since the uterus could be cleared out under direct vision and not by touch. He concluded by asserting that the life of the mother was much more important than the life of the child, especially as it was impossible to foretell whether the child would be an asset or otherwise to the community.

# Reviews.

## THE RESPONSES OF THE BLOOD VESSELS OF THE HUMAN SKIN.

THE wealth of experimental material presented in this monograph on *The Blood Vessels of the Human Skin and their Responses*[1] had already formed the basis of Sir THOMAS LEWIS'S Croonian Lectures, delivered before the Royal College of Physicians of London in June, 1926, of which an abstract was published in this JOURNAL on July 10th of that year (1926, ii, p. 61). Much of the work has appeared in detailed form in an imposing series of original memoirs, published chiefly in *Heart* and in the *Journal of Physiology*, from 1916 onwards. Sir Thomas Lewis, with his co-workers at the time, was, indeed, the first among the several investigators, in different countries, who in the past decade have contributed to the new awakening of interest in the activity of the minute blood vessels, and in its importance for the adjustment of the circulation to the needs of the tissues. Krogh's book, embodying his Silliman Lectures on the capillary blood vessels, has acquainted a wider circle with much of the work in this field. In the work under review full justice is done to the collateral evidence produced by other investigators, in so far as it has a bearing on the author's own theme; there is, indeed, a bibliography containing 273 references. The book, however, is essentially an orderly presentation and discussion of the investigations carried out during the past eleven years by Sir Thomas Lewis himself and his colleagues on the reactions of the small, and largely of the minute, blood vessels, in one tissue of one species—in the skin of man. It has, accordingly, the invaluable quality, the peculiar interest, and authority of a personal document. We see the problem as it originally presented itself to the author. We can follow the gradual unfolding of the story, the shaping and testing of every link in the chain of evidence. As the reaction of the skin vessels to each type of stimulus comes in turn under investigation we see the separate lines converging to one inevitable conclusion. The results are of high intrinsic importance, but this reasoned presentation of them is of even wider interest as a demonstration of scientific method, and, in particular, of its application to the study of reactions of the normal human body.

While apparatus of precision is used where the nature of the observation demands it—as in the measurement of small localized changes in skin temperature—many of the experiments recorded, and among these some of the most important, employ only the simplest technique. They could be repeated by anybody possessing a Riva-Rocci armlet, a needle, a flat ruler, a thermometer, and—the only uncommon item in the equipment—a faculty of keen and accurate observation. A few milligrams of histamine would also be serviceable. With such simple tools, and with a masterly ingenuity in so combining their use as to give significant results in logical sequence, Sir Thomas Lewis weaves the close fabric of his argument. From the pattern emerges a common type of vascular reaction in the human skin to mild injuries of all kinds, mechanical, chemical, or thermal—the "triple response," consisting of the sharply localized capillary dilatation, the coincident wheal which succeeds it, and the surrounding "flare," which is due to arterial dilatation produced by the local axon-reflex. Point by point the evidence is accumulated to show that all three constituent phases of this complex response are due to the local liberation from the injured epidermal cells of a chemical substance, identical in its action with histamine, but here referred to, with proper caution, as the "H-substance." The idea that injured cells may liberate such a histamine-like substance, producing a local capillary dilatation and wheal or a general circulatory collapse, according to the manner and dimensions of the injury, is not new in itself; the novelty is the production of precise and convincing evidence for what was hitherto but a plausible suggestion. In the case of the surrounding arterial dilatation, on the other hand, the conception that this, though produced by a local nervous reflex, is also due to the liberation of the "H-substance," acting in this instance on the sensory nerve endings, is both novel and surprising. Even more so is the conclusion that peripheral liberation of the "H-substance" is responsible for the vasodilatation and vesicle formation caused by irritation of a sensory nerve, as in the Stricker-Bayliss antidromic dilatation and in herpes zoster. There is some difficulty—teleological, one may admit—in the conception that vasodilatation, resulting from such irritation of an axon having a vasodilator as well as a sensory peripheral branch, should be due to liberation of H-substance in the neighbourhood of the sensory endings, and a consequent axon-reflex, rather than to direct passage of impulses down the vasodilator collateral. Sir Thomas Lewis does not, indeed, exclude the latter mechanism as a possible factor; but it is the former which his evidence supports, and the evidence is as cogent and as irresistible as any that he brings forward.

This triple vascular reaction to injury, and the chemical stimulus responsible for it, constitute the central theme of the treatise. Most of the other vascular reactions described have some relation to it. Thus the reactive hyperaemia following temporary arrest of the circulation is shown to be due to the accumulation of H-substance during defect of the cleansing stream of the blood. The anaphylactic reaction, studied in terms of its local expression in the skin, receives an interpretation of new clearness. Hitherto there was difficulty in reconciling the two lines of evidence as to its nature. There was strong reason, on the one hand, for attributing it to the interaction of the sensitizing antigen and a specific antibody in the living cells. On the other hand, the obvious similarity between the details of the anaphylactic reaction in different organs and different species, and the effects produced by such substances as histamine in the same organs and species, had led many to support the view that a substance having this type of action, an "anaphylatoxin," was liberated, by some fermentative or other action of antibody on antigen, *in the blood*. The two lines of evidence, when viewed in the light of Lewis's demonstration, lead to a common conclusion. The immediate effect of the interaction of antigen and cell-fixed antibody is, like that of the injury of the protoplasm by other methods, the liberation of the H-substance from the cells, producing, in each organ or tissue in which it is thus liberated, the characteristic response of that organ or tissue to histamine.

It is impossible in the scope of a review to touch upon more than a few of the numberless points of suggestive interest to be found in this monograph, but one of more general significance deserves further notice. All the world of medical science knows of the leading part which Sir Thomas Lewis played in that remarkable advance in clinical knowledge of the defects of the heart's action, made possible by the experimental analysis of the mechanism of the normal mammalian heart beat. Here we find him conducting an investigation, equally exhaustive and original, into the physiological behaviour of another part of the normal circulatory mechanism. In this study of the blood vessels of normal skin he finds that man himself provides not only a possible, but for many experiments the only possible, subject. He is led to generalize from this experience, telling us that his chief motive in writing the book was "a desire to stimulate a wider study and teaching of human physiology; for knowledge relating to the healthy man forms the most manifest and abiding bond between physiology and medicine." It is obvious that the data of physiology can furnish a firm foundation for human medicine only in so far as they are valid for man himself. The case of the reaction of the skin vessels is, however, a special one. The human skin is peculiar in its nakedness and in the readiness and variety of its vascular responses, while the skin is pre-eminent among the organs in its harmless accessibility for experiment. In other large domains of its activity, however, as in studies of respiratory metabolism and the effects thereon

[1] *The Blood Vessels of the Human Skin and their Responses.* By Thomas Lewis, M.D., F.R.S. London: Shaw and Sons, Ltd. 1927. (Cr. 4to, pp. xv + 332; 76 figures. 37s. 6d. net.)

of climate and exercise, physiology has long used, and increasingly uses, the method of direct experiment on normal man. The response of physiology to Sir Thomas Lewis's stimulus is assured; there are probably several centres of teaching already in which students are watching the appearance of wheals and flares on their own arms, to the necessary exclusion from the syllabus of some of the traditional experiments on muscles and nerves of frogs. It is of more urgent interest to know what effect this brilliant monograph will have on the bond between physiology and medicine. Will pathology and medicine join with physiology and produce the appropriate "triple response" to its stimulus? H. H. D.

## BIOLOGICAL MEMORY.

A VOLUME entitled *Biological Memory*[2] is a translation of a monograph by Professor EUGENIO RIGNANO, editor of *Scientia*, and a distinguished philosopher. Professor E. W. MACBRIDE, who is responsible for the translation, has written a useful critical introduction, in the course of which he observes that, while the theory developed by the author may require much modification in detail, it is an astonishingly successful effort to analyse vital phenomena. If it is not true, he says, it at least bears a strong resemblance to what the truth must be.

Professor Rignano aims at an exhaustive analysis of the differences which distinguish living from inert matter, and attempts to account for them as the manifold effects of a single quality—memory. Living things remember, inert matter does not remember. We are, of course, familiar with the fact that impressions made by experience leave permanent traces upon the psychism of the individual, and that these impressions are capable of being reproduced in consciousness. Mental development would clearly be impossible were it not for the existence of mnemonic phenomena. The author makes it evident that deep and unsuspected analogies can be traced between biological phenomena in general and biological development in particular on the one hand, and those of memory in its narrower or psychic sense on the other. In the course of his essay he suggests that the tendency of organisms to maintain their own internal environment in the same physiochemical conditions which prevailed when life first appeared; the transmissibility of acquired characters which he holds to be established, and the ontogenetic development of organisms; the innate instincts of animals; psychic manifestations of whatever nature—all these phenomena, including even assimilation, thanks to the mnenomic substratum which can be detected in all of them, may be considered as merely very different manifestations of one and the same fundamental phenomenon. We cannot here outline the hypothesis of "centro-epigenesis" which the author advances as an explanation of the manner in which acquired characters—that is to say, habits called forth as reactions to a changed environment—can be transmitted to the offspring. Irrespective of the validity or otherwise of this hypothesis, we feel that the author had done much in this book to bridge the gap which exists between physiological and psychological phenomena —both of which are manifestations of life. We are apt to set down physiological and mechanical action under one head, and conscious or mental action under another, whereas the distinctions between physiological and mechanical action are similar to those between the latter and mental action. The line of demarcation is not between physiological and conscious behaviour, but between living and non-living.

## THE EFFECTS OF CONTRACEPTIVE PRACTICES ON THE FEMALE SEXUAL ORGANS.

THIS pamphlet on *The Effect of Contraceptive Practices on the Female Sexual Organs*[3] is written by the president of the League of National Life, Dr. FREDERICK J. MCCANN. The objects of the League are to combat the theory and practice of contraception (birth prevention); to oppose any form of State or municipal assistance for the promotion of contraception; and to uphold the honour and blessing of parenthood. In the pamphlet an attempt is made to establish the thesis that a woman deprived of the full physiological value of sexual union will sooner or later develop changes in her genital organs, the most important of which is a slight uniform enlargement of the uterus, with softening of the cervix and body. The symptoms of "the Malthusian uterus," as the author terms it, are menorrhagia, leucorrhoea, backache, and pelvic discomfort, all of which are far from unusual in women who have had large families and have never tried to prevent conception.

He is on safer ground in discussing the ill-effects of mislaid sponges and pessaries, left indefinitely in the vagina, the dangerous "wish-bone" type of intrauterine pessary, and the irritation caused by some chemical pessaries. Possibly because of the title chosen for his pamphlet, Dr. McCann says little of what is undoubtedly by far the commonest ill-effect of birth prevention, and that is, the mental. The remark is made, however, that the psychical effects of contraception often culminate in dissatisfaction, disappointment, and ultimately disgust, and may end in a nervous breakdown which compels attention. The resulting disorders of the menstrual and other functions of the reproductive tract and symptoms referred to the pelvic organs are scarcely touched on, whilst vague and unscientific statements are made, such as that contraception promotes "congestive changes in the pelvic organs." The more cautious conclusion in regard to the etiology of fibroids will meet with general acceptance, for all that is said is that whether they are the cause or the consequence of sterility is still a debated question, but that the available evidence favours the view that both sterility and diminished fecundity conduce to their growth. On the other hand, the basis of his argument in the sections on cancer of the body of the uterus, ovarian tumours, and contraception during pelvic disease is insecure, and the evidence for his conclusions very thin.

There are many good points in Dr. McCann's essay, and among them we are pleased to notice the attention he draws to the exaggerated fertility of women and its results often assumed by birth control propagandists; we regret, however, that he has not resisted the temptation to overstate his case and has not kept more strictly to the lengths accurate clinical observation will allow. As a result he falls into the same errors as the propagandists on the opposite side, and may thus offer an easy target for their counter-attack.

## COMPARATIVE ANATOMY OF THE EYE.

To the average English reader French is a more accessible language than Italian, and we welcome with pleasure the translation by DR. CHARLES DEJEAN of the classical work of Professor OVIO of Padua on the comparative anatomy of the eye.[4] The volume is a large and formidable one, but contains in very readable form a wealth of information which, as far as English literature is concerned, remains completely unclassified.

The first part deals with the elementary response of the primitive visual apparatus to light. This, it will be remembered, was primarily motor, a tropism, and out of this the sensory functions of vision developed. The second part describes the various types of eyes met with in the animal kingdom: the epithelial structures (simple or composite) of the invertebrates and the "cerebral" eye of the vertebrates. Each individual structure is then dealt with and its morphology and phylogeny described in considerable detail. The last part deals with the physiology of the organ and comprises a description of the nutrition of the eye, its extrinsic movements, the movements of the iris and the migration of pigment, the dioptric system, accommodation, visual sensations, adaptation, colour vision, appreciation of form and movement, the visual field and binocular vision.

Considering the vast extent of the field which is covered, it is evident that the treatment of many of the subjects

[2] *Biological Memory.* By Eugenio Rignano. Translated with an introduction by E. W. MacBride, D.Sc., LL.D., F.R.S. London: Kegan Paul, Trench, Trubner and Co., Ltd. New York: Harcourt, Brace and Co., Inc. 1926. (Demy 8vo, pp. vi + 253. 10s. 6d. net.)

[3] *The Effect of Contraceptive Practices on the Female Sexual Organs.* By Frederick J. McCann, M.D., F.R.C.S. London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd. 1927. (Med. 8vo, pp. 16. 1s. net.)

[4] *Anatomie et Physiologie de l'Œil dans la Série Animale.* By Professor Joseph Ovio. Revised translation by Dr. Charles Dejean (of Montpellier). Paris: Felix Alcan. 1927. (Sup. roy. 8vo, pp. vi + 736; 307 figures. 120 fr.)

must necessarily be somewhat cursory, but in spite of its comprehensive and ambitious nature the book never loses proportion in the presentation of the subject matter, and never loses interest in its manner of treating it. It is primarily a reference book, although in no sense a mere encyclopaedia. It reveals the vast industry and comprehensive knowledge of its author, and the translator has done it every justice.

## TWO *X*-RAY ATLASES.

A LITTLE over two years ago the first edition of MCKENDRICK and WHITTAKER'S *X-ray Atlas of the Normal and Abnormal Structures of the Body* appeared, and now a second edition[5] is issued. Many additional radiographs appear in the new edition, and special attention should be called to the series which show lipiodol injections of the bronchi. These have been supplied by Dr. John Guy, who also furnishes a note on the method employed.

The book has been extended by thirty-four pages, but, except for these additions, is substantially the same as when first published. No attempt seems to have been made at any definite revision, and many very poor and quite inadequate radiographs have been retained. One notable omission is in the part dealing with the spine, for with one exception—a lateral view of the cervical spine—no lateral views are reproduced; this is difficult to understand, as there is no doubt that in probably most cases of disease and injury the lateral view is of more importance than the antero-posterior. A further criticism might also be made that, with ample space, the authors have not seen fit to add to the descriptions accompanying each radiograph. The bald statement that this or that picture is an example of this or that condition is hardly calculated to convey much information of value to a practitioner who may not be an expert, and it is obvious that it is to the general practitioner that a book of this kind appeals. We venture to think that, generally speaking, a greater effort should have been made to point out the nature of the *x*-ray changes shown. This could have been done without increasing the size of the book, and would have added much to its value. However, that a second edition has been called for in so short a time shows that there has been a considerable demand for the atlas, and there is no doubt that it serves a useful purpose. It is a pleasant book to handle, inasmuch as it is well presented and attractive, and it is printed on paper which suits the illustrations and renders good reproduction of the radiographs possible.

The *Atlas de Radiographie Osseuse*,[6] by HARET, DARIAUX, and QUÉNU, presents a series of radiographs in a somewhat novel manner. There are two reproductions of each, either side by side or opposite to one another, the one in the usual style, whilst the other is the same radiograph with the outlines artificially strengthened, and marginal notes stating what is the cause of each part of the shadow. The atlas is beautifully got up and is of large size, but very unfortunately in the bulk, and especially the more difficult parts, such as the head, etc., the radiographs are by no means up to the standard of modern *x*-ray technique. Except for a very short introduction, and at the end a few tables dealing with the data of ossification of the bones and epiphyses, there is no printed matter other than the marginal notes. The material for practical purposes is divided into two main parts, the first consisting of some sixty odd representations of the adult human skeleton, and the second, with sixty illustrations, dealing with the child from the time of intrauterine life to the age of 16. A book of this kind, dealing only with the normal, is useful for teaching, and will be valuable for occasional reference in an *x*-ray department. It is a novelty, inasmuch as it differs from most atlases in portraying only the normal appearances; and as a knowledge of the normal is essential in reading the abnormal it is a handy method of having at hand a series of the normal in which any individual bone can be looked up, whilst the marginal notes will at once indicate the various radiographic points. Medical students and those reading for a diploma in radiology will find it of value.

[5] *An X-Ray Atlas of the Normal and Abnormal Structures of the Body*, By Archibald McKendrick, F.R.C.S.Ed., D.P.H., F.R.S.E., and Charles R. Whittaker, F.R.C.S.Ed., F.R.S.E. Second edition, revised and enlarged. Edinburgh: E. and S. Livingstone. 1927. (Demy 4to, pp. xv + 256; 448 figures, 120 plates. 30s. net.)

[6] *Atlas de Radiographie Osseuse*: I. *Squelette Normale*. Par G. Haret, A. Dariaux, Jean Quénu. Avec la collaboration de H. P. Châtellier. Préface du Professeur Pierre Duval. Paris: Masson et Cie. 1927. (Roy. 4to, pp. 129; 123 figures, 160 fr. sans majoration.)

## NOTES ON BOOKS.

THE third edition of *Ker's Manual of Fevers*[7] has been ably revised by Dr. CLAUDE RUNDLE, medical superintendent of the Fazakerley Hospital, Liverpool, who is to be congratulated on having brought the work up to date without modifying its essential features. The new matter includes information about the bacteriology of measles and scarlet fever, the Dick and Schultz-Charlton tests, immunization against scarlet fever and the antitoxin treatment of the disease, and the serum prophylaxis of measles. We are pleased to see that the reviser recommends much larger doses of antitoxin than those mentioned by Dr. Ker, and that he deprecates the routine administration of alcohol in diphtheria, which was advised in previous editions of the work. We have detected a few omissions. Although reference is made to Caronia's organism, there is no mention in the paragraph on the etiology of measles of Tunnicliff's green producing diplococcus, which is more likely to be the causal agent of the disease; nor do we find any reference to Ramon's anatoxin, erythema infectiosum, or exanthema subitum, to which so much attention has been given lately in Continental and American literature. We note with regret that the two half-tone illustrations of scarlet fever and serum rashes have been retained, though they might, as we pointed out in the review of the last edition (JOURNAL, April 22nd, 1922, p. 646) have been better replaced by coloured plates or omitted altogether.

*Practical Tropical Sanitation*,[8] by Drs. MINETT and SEVERN, represents the second edition of a somewhat smaller work by the first named author published seven years ago. It is a little difficult properly to assess the value of this book, as the preface states that it is for "sanitary inspectors and others in tropical countries." The "others," from the general character of the book, must mean non-medical persons, and the directions to inoculate all contacts with antiplague and T.A.B. vaccines would not come within the province of either. There is a considerable improvement on the first issue. The number of pages has been increased by fully one-third, and the illustrations by 25 per cent., but, as several pages previously occupied by the regulations and by-laws in force in British Guiana have been omitted, the additions are more than the mere number of pages would indicate. We note incidentally that the picture of Dr. Balfour's fly-trap is still deprived of its tempting approach, without which the flies depicted would certainly not be enticed to enter. The authors' experience in China enhances the value of the present edition, for the former was based almost entirely on conditions in British Guiana. The most notable addition in the present issue is the final chapter on schools, for which the assistance of Mrs. Minett, who has had experience in both the West Indies and the Far East, has wisely been enlisted.

For a book he has written on therapeutics in general practice[9] Dr. CHARLES FIESSINGER, who is a corresponding member of the Académie de Médecine, draws on an experience of nearly fifty years. These years have taught him that in many maladies nature is still more intelligent than the doctor. It is not surprising, therefore, to find that he has small respect for intravenous medication, which seems to be very popular in France, and still less for the intraspinal administration of drugs. He does not believe in homoeopathy, but he finds that two of Hahnemann's principles were correct. For confirmation of the principle that like cures like he advances the doubtful argument of vaccination. The other principle is that if the immediate effect of a remedy is violent its duration is short, and vice versa. Upon this principle Dr. Fiessinger bases his view that the causes of disease should be treated by large doses, in order, so to speak, to knock the disease on the head, while the symptoms of disease should be treated by minimal doses of drugs. Dr. Fiessinger is insistent upon the confidence inspired by the doctor as a therapeutic agent of the highest value. After a chapter devoted to meditations such as these, and a second on general therapeutics, the author describes the treatment he has found successful in diseases of various tracts of the body.

[7] *Ker's Manual of Fevers*. Revised by Claude Rundle, O.B.E., M.D., etc. Third edition. Oxford Medical Publications. London: Milford, Oxford University Press. 1927. (Cr. 8vo, pp. xv + 346; 15 figures, 4 plates. 12s. 6d. net.)

[8] *Practical Tropical Sanitation*. By E. P. Minett, M.D., D.P.H., D.T.M. and H., and A. G. M. Severn, M.A., M.D., D.P.H. Second edition. London: Baillière, Tindall and Cox. 1927. (F'cap. 8vo, pp. viii+180; 59 figures. 5s. net.)

[9] *La Pratique Thérapeutique en Clientèle*. Par Ch. Fiessinger. Comment Guérir. Bibliothèque des Praticiens. Paris: N. Maloine. 1927. (Imp. 16mo, pp. 342. 20 fr.)

The sixth issue of *L'Année médicale pratique*,[10] edited by Dr. CAMILLE LIAN, supported by a staff of thirty-three contributors, contains in alphabetical order a concise account of the chief recent contributions to medical literature. A classified list of the principal French medical works published during the year is appended.

In *Nan of Aviemore: A Highland Tragedy*[11] Dr. A. NIVEN ROBERTSON tells in easy verse a story gripping in its dramatic situations and withal attractive in the human pathos and word pictures of the Highland glens in summer and in storm. Nan is a fine independent character in love with a stalwart countryman, who, while seeking his fortune abroad, is concussed, and becomes so changed that he brings evil upon all who love him, eventually causing her death. In the background there is a fine picture of a country doctor, with his self-denying ordinance. Mixed with idealism there is realism, as shown in the account of a music-hall in the purlieus of a foreign city:

> "Or else to see a bloated mass of flesh
> In fitting tights, 'the fattest woman known,'
> Beside a man disease had in its mesh,
> 'The thinnest man on earth,' all skin and bone."

At the commencement of this interesting story in four cantos the reader is warned that the persons and events described in the poem are entirely imaginary, and that no reference is made or intended to any living person.

[10] *L'Année médicale pratique.* Edited by Dr. Camille Lian. Sixième année. Paris: René Lepine. 1927. (Fcap. 8vo, pp. xx + 528; 16 figures. 24 fr.)

[11] *Nan of Aviemore: A Highland Tragedy.* By A. Niven Robertson. London: Erskine MacDonald, Ltd. 1927. (Cr. 8vo, pp. 67. 3s. 6d.)

## PREPARATIONS AND APPLIANCES.

*Ultra-violet and Radiographic Apparatus.*

MESSRS. WATSON AND SONS (43, Parker Street, Kingsway, W.C.2) announce that they can supply British-made carbons for ultra-violet emission which are entirely reliable and cheaper than those of foreign make. It is claimed for these carbons that it is possible to standardize the ultra-violet output in such a manner as to cover all requirements. The same firm has issued a second edition of a pamphlet entitled *Radiography for the Dentist.* After pointing out the possibilities of dental radiography the question of cost is discussed, and it is stated that a complete apparatus required for this form of *x*-ray work can really be purchased for a comparatively small sum, and that the upkeep and running expenses are moderate. The necessary apparatus is described and illustrated, and there are notes on the technique.

## MEDICAL EDUCATION IN INDIA.

REPORT BY SIR NORMAN WALKER.

DURING the early part of the present year Sir Norman Walker visited the medical colleges and associated hospitals of several Indian universities, and in a report to the Secretary of State for India, which is printed in the minutes of the Executive Committee of the General Medical Council, he summarizes his observations.

Until quite recently medical education in India was directed and controlled by the Indian Medical Service. "That it is as good as it is," says Sir Norman Walker, "and in many respects it is excellent, is almost entirely due to the zeal, energy, and versatility of that Service." With the Indian Medical Service the various colleges grew up in close relationship, all the professors were presidency medical officers, and at first and for many years all of them were Europeans. So long as the Government was solely responsible for staffing the colleges almost all the candidates were holders of British qualifications, inasmuch as entrance to the Indian Medical Service, from which the staffs were drawn, could be gained only by passing an examination in London. But medical administration, including provision for medical education, has now become a provincial subject in India, and the change has been followed in the colleges everywhere by a great diminution in the number of European teachers. Methods of providing teachers other than through the Indian Medical Service have been called for, and men whose teaching experience has been small and whose training as teachers has been brief have been appointed to professorships. Sir Norman Walker thinks it would be well if young men of promise, after a couple of years' service in a scientific department of an Indian university, were sent abroad to carry their studies further under different conditions before being appointed to chairs.

With regard to examinations, he points out that there is no pre-registration examination in India; and also that all age limitations for the matriculation examination have been removed, so that not a few candidates pass at the age of fourteen, and after two years spent in studying for the intermediate arts or science examination, find it possible to commence the study of medicine proper at 16, which is one year earlier than in this country. The level of secondary education in India is admittedly lower than in Great Britain, and no British university accepts the matriculation examination of an Indian university as equivalent to its own. After pointing out that it is easier to work hard for nine months out of twelve in Great Britain than in India, Sir Norman Walker suggests, as to the medical curriculum proper, that it would be well if all the Indian universities followed the lead of Calcutta in establishing a curriculum of six years (eighteen terms) and continued in the curriculum the study of chemistry, physics, and biology as applied to medicine.

At present the length of the medical curriculum varies in different universities from thirteen to eighteen terms. In anatomy, physiology, pathology, and materia medica and pharmacology India shows to great advantage, and the laboratories are generally satisfactory in building and equipment. Hygiene is taught usually by the officers of the public health department in the respective provinces, and the teachers are well qualified and experienced. Forensic medicine—a very important subject in India—is taught by lecturers, usually the civil surgeon or his assistant, or by the police surgeon in addition to his ordinary work. The teaching in systematic medicine, surgery, and midwifery is along lines similar to those followed by medical schools in this country twenty years ago. In practical midwifery there has been an improvement during the last five years. Madras has an excellent maternity hospital, and in Bombay the new Wadia hospital will provide opportunities for teaching second to none. The teaching of midwifery and gynaecology in the Calcutta Medical College is at a high level, and in Lahore an excellent modern maternity hospital is well on the way to completion, but in Lucknow things are not so far advanced.

So far as hospitals in general are concerned, Sir Norman Walker says that some of the new ones are really excellent, and India is to be congratulated on its hospital architects. The ophthalmic department is nearly always a special feature of Indian hospitals. In Madras the ophthalmic hospital, thanks to the zeal and perseverance of Colonel R. H. Elliot and his successors, is one of the finest in the world. The special departments for diseases of children, ear and throat, skin, venereal diseases and tuberculosis, have a long way to go to catch up with ophthalmology. The arrangements for the teaching of mental diseases also leave much to be desired. There are many large asylums in India, but they are rarely in close proximity to the medical colleges. With regard to research, Calcutta has one of the foremost schools of tropical medicine in the world, and institutes at Kasauli, Bombay, and Madras are all doing admirable work, but it is greatly to be desired that research should be active in many centres, notably the universities.

On the general subject of organization of medical education Sir Norman Walker states that what India lacks is a co-ordinating authority between the universities. That universities should be independent and should follow the lines which seem to them most fruitful is generally admitted by educationists, but when medicine is concerned the public interest is involved to a greater degree than with any of the other faculties. Here independence and autonomy must be combined with a minimum standard maintained for the public benefit. Some more satisfactory basis than periodic visitation and inspection through the direct agency of the General Medical Council should be found. The number of medical colleges has doubled since

Sir Norman Walker's first visit of inspection to India in 1922, and the need for setting up there some co-ordinating authority comparable to the General Medical Council, with which the Council could communicate, grows more urgent. The absence of any such directing authority in India is really the chief obstacle to a satisfactory solution of the problem. Pending the setting up of such a body, he suggests that a commissioner of medical qualifications and standards with a permanent office at Delhi should continue and extend the work already done by the Council's inspector, Colonel R. A. Needham, who has just completed the last of a series of visits and reports extending over a period of five years, and is now home on long leave. The General Medical Council would willingly accept the suggested commissioner as their visitor, until a central authority can be established, and his regular reports would be of much assistance in determining whether or not recognition should be accorded or continued.

## CINEMATOGRAPHY APPLIED TO THE STUDY OF TISSUE GROWTH.

### DEMONSTRATION BY DR. R. G. CANTI.

MUCH interest was aroused at the Annual Meeting of the British Medical Association at Edinburgh by Dr. R. G. Canti's cinematograph demonstration of the growth of normal and malignant tissue cells. The application of cinematography to medical research represents an advance on the study of living cells by dark-ground illumination, to which we have referred more than once during the last twelve months; in this work Dr. Canti was associated with the late Dr. T. S. P. Strangeways, and a description of the procedure they devised was given in our issue of July 24th, 1926 (p. 155). Those interested in the subject may be referred to an article by these two authors in the *Quarterly Journal of Microscopical Science*, May, 1927, which contains some particularly good illustrations. Their research formed part of a larger investigation into the nature of cancer in progress at the Strangeways Research Hospital, Cambridge, and at St. Bartholomew's Hospital.

The obvious impossibility of continuing observation over long periods of time and of retaining in the memory the ever-changing condition of the cells led to the introduction of the cinematograph. By this means a series of pictures, taken at frequent and close intervals over as long a period as might be necessary, provided a record which could be referred to as often as desired. Moreover, by running the film backwards, events could be observed in the reverse order of time, and thus be traced to their origin—an ideal method of conducting biological research. The tissues photographed specially for display at Edinburgh were the periosteum of the chick embryo and a malignant tumour of the rat, known as Jensen's rat sarcoma; these were cultivated at the laboratories in Cambridge. Ordinarily in cinematograph films the individual pictures are taken at the rate of 16 a second and are projected at the same speed. In the "slow motion" films the speed of taking is increased to 50 or 500 a second, or in some cases even to 5,000 a second, the projection being at the normal rate of 16 a second. The films exhibited at Edinburgh were the reverse of this, and might be termed "quick motion"; the exposures were made at intervals of 3, 10, 30, or 60 seconds, and the results being projected at the speed of 16 a second gave the impression of speeding up of 50, 160, 480, or 960 times respectively. Dr. Canti explained that the apparatus used had to be specially constructed. The optical parts were built on a concrete bed supported on alternate layers of concrete and sorbo sponge to prevent vibrations. The mechanical part of the apparatus was capable of running automatically for as long a period as required.

Dr. Canti's first cinematograph picture showed the microscope slide on which the culture was prepared, the minute original implant of tissue being just visible in the centre. The second picture, which was one of the most impressive, was taken under low magnification, and showed the whole of the original implant during incubation at 38° C. for twenty-seven hours. Soon after the commencement of incubation the wandering cells could be seen coming out from the implant. These were quickly followed by fibroblasts growing out radially and giving the implant a fluffy appearance. This migrating continued until the field was covered, the actively amoeboid wandering cells always keeping in advance of the fibroblasts. The speeding up of this picture was 960 times, and Dr. Canti explained that the audience, while being careful to realize this fact, might for the moment ignore it, as after all time was relatively unimportant. They had the advantage at this demonstration, in half an hour or so, of seeing the events which took more than five days to happen. A series of individual cells was then shown under a higher magnification undergoing cell division. The elongated fibroblast was seen to become shortened and to round up into a spherical form, and, the nucleus having disappeared, the chromosomes could be seen arranged equatorially. Then followed a quick series of events. The chromosomes migrated rapidly, half to either pole of the cell; the cell developed a waist and divided; each portion underwent violent bubbling, processes of protoplasm being thrown out and withdrawn with great activity. As this gradually simmered down the two halves slowly re-formed into two vegetative daughter cells and wandered away from each other, the fresh nucleus in the meanwhile gradually reappearing. Then followed a series of pictures illustrating the growth of sarcoma tissue, the cells of which were in striking contrast to the normal tissues already shown. Two varieties of cell at least were present. One, which was highly mobile, was furnished with long, actively moving pseudopodia, which ended in fine fimbriated extremities; the other, or fibroblastic type, was less mobile, in shape rounder and with undulating edges. The degeneration of some of these cells was watched; the active and more healthy cells were seen to be attracted and to adhere to the edges of those which were degenerate.

Dr. Canti explained how the method of observation could be applied to the investigation of a variety of problems in many fields, and instanced pathological, pharmacological, and physiological, as well as biological research. His present line of investigation was the effect of radium irradiation on normal and malignant tissues, and the second reel dealt with his photographs to date. The radium used was in the form of radium emanation (radon), and was supplied by Professor Russ. The quantity varied in different experiments from 70 to 150 millicuries, and the distance of the radon from the culture ranged from 4 to 7 mm. The radon was unfiltered, except by the walls of the capillary glass container and the coverslip of the tissue culture preparation. The cells were therefore receiving both beta and gamma radiation of relatively high intensity. In order to record the time at which events took place a small clock was photographed in the corner of the film. The details of the experiment and the time at which the radon was applied to the culture were noted in a caption preceding each section of the film. First the effect on normal periosteum was observed. Cell division, which was plentiful before the radon was applied, ceased immediately, the spreading edge of the fibroblasts advanced no further, and the movements of the cells themselves were arrested. A proportion of the fibroblasts became rounded and degenerated, giving rise to the "breaking down" cells characteristic of irradiated cultures. The majority of fibroblasts, however, were not affected in this way. The wandering cells continued their amoeboid movements for twenty minutes after irradiation was commenced and then became still and eventually broke down. The last series of films depicted the effect of radon on the sarcoma tissues, which was dramatic. Within fifteen minutes of the application of the radon the seething mass of cells was completely immobilized, and those which were in the act of cell division did not continue the process. As time went on the cells became rounded, their edges became indistinct and irregular, and the final stage of disintegration set in.

SIR ROBERT PHILIP, at the first demonstration, expressing the appreciation of the audience to Dr. Canti for giving this demonstration three times, congratulated him on his important revelation of cell life, and hoped that valuable developments might follow in the near future.

# Nova et Vetera.

## PROVINCIAL CONSULTANTS IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES.

AMONG the many alterations in the social life of this country which followed on the introduction and spread of the railway system, one of the most striking was the decay of the importance of country towns. Perhaps the smaller towns, especially those within comparatively easy reach of London, suffered most.

In the novels of the end of the eighteenth century—such, for instance, as Jane Austen's *Emma*—we read of dances held in inn rooms, as in the little town of Highbury, which, if not identifiable with Epsom, was at least no further from London; and in such a small place as Uckfield in Sussex there was till recently a large assembly room in the principal inn. If such provision for social gaieties was common in minor towns, it was still more usual and greater in the large provincial capitals such as Salisbury or Exeter. At the same time the well-to-do inhabitants of such places and of the country around them often had recourse to consulting physicians and surgeons in those capitals rather than to those of the metropolis. Even later George Eliot, in her description of society in Middlemarch, writes of a physician as practising there as well as the surgeons and apothecaries. Erasmus Darwin of Lichfield is a much earlier instance, and there were, of course, many others after his time, including Sir Charles Hastings, the founder of the British Medical Association, who established himself in Worcester the year after Jane Austen's death. Worcester was indeed a good example of a county town self-contained so far as the practice of medicine went, and so continued down to our own times, as did many other cathedral towns.

In a recent correspondence in the *Times Literary Supplement*, Mr. Paul de Castro has drawn attention to a once well known Salisbury surgeon, Mr. Edward Goldwyer or Goldwyre, who died in 1774. His father, William, had also practised in Salisbury, and two of his brothers were practitioners in Blandford and Marlborough respectively. Mr. de Castro argues with much force that Edward Goldwyer was probably the surgeon who treated the first wife of Henry Fielding the novelist, when her nose was severely injured in a carriage accident, an event which made an incident in his novel *Amelia*.

That Edward Goldwyer was a surgeon of note is evident from the following letter which was found among his papers. It is given in an anonymous work in three volumes, published in 1825 under the title *Professional Anecdotes or Ana of Medical Literature*.

"Fisherton-Anger Gaol, October 3rd, 1736. Sir:—Being informed that you are the only surgeon in the city or county, that anatomies men, and I being under the present unhappy circumstances, and in a very mean condition, would gladly live as long as I can: but by all appearances I am to be executed next March, having no friends on earth that will speak a word to save my life, nor send me a morsel of bread to keep life and soul together until that fatal day; so if you will vouchsafe to come hither I will gladly sell you my body (being whole and sound) to be ordered at your discretion; knowing that it will rise again at the general resurrection, as well from your house as from the grave. Your answer, Sir, will highly oblige. Yours, etc., James Brooke."

This letter was addressed "to Mr. Edward Goldwyre [*sic*] at his house on the Close of Salisbury." For what offence James Brooke was doomed to die we cannot tell, but it was quite probably a comparatively trivial one, such as a small theft. One would like to think that Goldwyer was able to save him from starvation and the gallows without accepting the offer of his cadaver. Such offers were probably rare, though it is said that the bereaved relatives sometimes solaced themselves with the proceeds of the sale of the corpse of the lamented one. It will be remembered that her detractors alleged against Mrs. Sarah Gamp that when her husband died—

"'and I see him lying in Guy's Hospital with a penny piece on each eye and his wooden leg under his left arm' . . . if certain whispers current in Kingsgate Street circles had any truth in them, she had indeed borne up surprisingly and had exerted such uncommon fortitude, as to dispose of Mr. Gamp's remains for the benefit of science." (*Martin Chuzzlewit*, ch. xxix.)

Goldwyer seems to have been an active pioneer in the practice of inoculation for small-pox, if Dr. Jurin's reference to the fifty-three cases inoculated in Salisbury by "Mr. Goldwyre, Surgeon," applies to him.

There is a monument to an earlier medical celebrity near the west door of Salisbury Cathedral. It commemorates Dr. Daubeney Turberville, who had a great reputation as an eye-surgeon and died in 1696. Dr. Walter Pope, F.R.S., who succeeded Sir Christopher Wren as professor of astronomy in Gresham College, and who himself held the degree of M.D.Oxon., composed the epitaph on Turberville, whose patient he had been. In the life of Bishop Seth Ward in Cassan's lives of the Bishops of Salisbury (Pt. III, p. 103), Dr. Pope gives us a lively account of Turberville and of his ways. Like Pope he was M.D.Oxon. It is said that it was by his mother's advice that he devoted his attention to diseases of the eyes, as "he would find it turn to a good account." The event proved her prescience, for he had crowds of patients whom he began seeing at eight o'clock every morning. "He generally prescribed to all shaving their heads and taking tobacco" (snuff?) "which he had often known do much good and never any harm to the eyes." Ophthalmology scarcely existed at that time, and the methods of regular and irregular practitioners were alike largely empirical. Here is a specimen of Turberville's methods, as recorded by his admirer Pope. The patient's eye was "protuberant and could not be contained within the lids, and seemed like a piece of raw flesh; the doctor placed him in a chair, and with a pair of scissors cut large gobbets, the blood trickling down his cheeks in abundance, and yet he seemed no more concerned than if it had been a barber cutting his hair; I was surprised at his behaviour and said to one of the bystanders, 'without doubt this is a married man, otherwise 'twere impossible to be so patient.'" (Pope was a bachelor.) What the result was of this heroic method of treating conjunctivitis we are not told.

Turberville's reputation in Salisbury spread to London, so that he was called in by the Duchess of York, to treat her daughter, afterwards Queen Anne, then a child. Other physicians and surgeons were dismissed and Turberville was put in sole charge and cured her "in a few months." It may have been during this visit to London that he was consulted by Samuel Pepys, for under the date June 22nd, 1668, we read in the Diary: "Mr. Boyle refers me to one Turberville of Salsbury, lately come to town, which I will go to"; and on June 23rd, "then to Westminster to Dr. Turberville about my eyes, whom I met with and he did discourse, I thought learnedly about them; and takes time before he did prescribe me any thing, to think of it." Lastly, on June 29th he wrote: "I stop at Dr. Turberville's and there did receive a direction for some physic, and also a glass of something to drop into my eyes: who gives me hope that I may do well." If, as Sir D'Arcy Power has shown is probable, Pepys's troubles were due to hypermetropia and astigmatism, no amount of drops or physic could have cured him, although the secondary conjunctivitis might have been relieved for the time. After his death in 1696 at the advanced age of 85, Daubeney Turberville's sister Mary was practising in London "with good reputation and success." No doubt she possessed his prescription books.

In recent years the pendulum of practice has begun to swing back again, for with the foundation of provincial universities and their medical schools, and the growth of hospitals in many other large towns, first-rate advice may be had without coming to London.

British Medical Journal.

SATURDAY, AUGUST 20TH, 1927.

## THE NATIONAL INSURANCE DRUG FUND.

IT should be within the recollection of all those interested that Section 2 of the Economy (Miscellaneous Provisions) Act, 1926, provides that the whole cost of medical benefit shall be a first statutory charge upon the Insurance Fund, as from January, 1927, up to a maximum, including administration, of 13s. for each insured person entitled to that benefit. In our comments on the Economy Bill while it was passing through the House of Commons (JOURNAL, April 10th, 1926, p. 663, and April 24th, 1926, p. 750) it was explained that the Medical Benefit Fund bears the cost, not only of the practitioners' capitation charge and mileage, but also of the supply of drugs and appliances to insured persons, and part of the cost of medical referees and some other administration expenses. We pointed out that it was only "the most elementary common sense" to make these costs a primary charge on the fund, as medical benefit is the fundamental provision on which all other insurance benefits depend; but we expressed very emphatically the opinion that it was far from wise to limit the charge to the maximum amount prescribed, or, indeed, to fix by statute any such maximum at all. We said at that time: "It may be doubted whether the maximum amount is really sufficient. The present capitation fee for practitioners is undoubtedly too low. The amount of work has demonstrably increased, even since the Court of Inquiry awarded the 9s. The call on the Drug Fund has increased considerably of late years, and does not yet appear to have reached its limit. . . . On present figures alone the margin available appears to be very small . . . and whether by reason of an expanding call for drugs and appliances, or by reason of a justly augmented payment to medical practitioners, no one can desire a repetition of the legislative situation which arose two years ago." These fears were, we understand, shared by the Ministry of Health, but our warning was unheeded by the Government, and already, in the first year of working, one of the contingencies we mentioned has arisen and the situation we indicated has come about. The demands on the Drug Fund have continued to expand, and there is not enough money within the 13s. limit to meet them without a radical modification of the arrangements with the pharmacists.

A circular now issued by the Ministry of Health to Insurance Committees informs them that such a modification has been negotiated, and indicates its main features. The arrangement is that "the chemists in England and Wales shall collectively accept liability for the provision of all the drugs and appliances prescribed for insured persons by insurance practitioners, and that in return they shall receive collectively the maximum amount available for the purpose." The agreement is to run for six years from January 1st last, subject to the right of the pharmacists to ask for a revision in certain contingencies; and the Minister of Health has undertaken that during its currency the annual sum available shall not be less than 2s. 9¾d. for each insured person concerned. There is a curious provision whereby an Insurance Committee may be able to reserve a proportion (not exceeding one-tenth) of its Chemists' Fund for any year for payment for those chemists who have been continuously on its list for a specified period of time. The implications of this are not fully evident, but it may be interesting to watch its practical working. In addition, "the Minister has undertaken to adopt every practical means with a view to checking unnecessary prescribing."

Any agreement of this general nature, though probably inevitable in the circumstances of existing legislation and the unwillingness of the Treasury to go beyond it, is not very desirable in the interests of the public, nor, we should have thought, in the interests of the pharmacists. It has features analogous to the former objectionable "floating sixpence" arrangement which insurance practitioners hastened to get rid of, with all its consequential regulations, at the earliest convenient moment. It gives an opportunity for adverse critics to allege that it is to the financial advantage of pharmacists in general that the quantity and quality of drugs and appliances supplied to insured persons shall be as small or as inferior as possible; and that there may be a temptation for the Ministry to bring undue pressure to bear upon insurance practitioners to restrain the amount and nature of their prescribing. Experience shows that even a consciousness of virtue is not a sufficient answer to such criticisms.

Insurance practitioners are tenacious of their right to prescribe whatever they believe to be of advantage to their insured patients. Under the present arrangements they have no financial interest whatever either in underprescribing or in overprescribing, and their liberty, short of sheer extravagance, is secure. The Medical Benefit Regulations have always contained provisions under which individual cases of extravagant prescribing, whether wanton or ignorant, can be investigated and checked. Formerly, when the initiative lay with Panel Committees, such action was taken from time to time. In recent years these provisions have been in abeyance, at first on account of a general inquiry undertaken by the Ministry, and latterly by reason of a surprising inactivity on the part of the Ministry and its officers, to whom the initiative has now passed. The Insurance Acts Committee, intervening at a late stage of the negotiations between the Ministry and the pharmacists, has had to resist the suggestion that these provisions should be strengthened in the direction of allowing pharmacists more direct power to make complaints against practitioners. The existing regulations and system of pricing are to remain unchanged, and Panel Committees should, of course, do their best to facilitate any reasonable action taken in accordance therewith.

The great and continuous increase in the calls upon the Drug Fund is disquieting, and practitioners, as other taxpayers, are concerned to check it in so far as it involves any demand for what is more than "proper and sufficient." The inquiry of the Ministry of Health already referred to disclosed the most extraordinary differences between practices and areas apparently comparable in respect to the cost of drugs and appliances per insured person. These differences have not as yet been explained, and they may prove inexplicable. There are, however, certain considerations which may go far to account for the general, though surprisingly great, increase of cost. In the first place, there is, no doubt, a much greater appreciation by insured persons of their opportunity for obtaining medical advice and attention, and an almost entire abandonment of their initial reluctance to take advantage of such opportunity. In the next place, there is

we believe, a reaction on the part of the medical profession from that scepticism as to the value of drugs which prevailed some years ago. With this has come a more prevalent and rational use of forms of medicament, more expensive than the old, by reason either of their origin or of their more careful preparation and testing. Further, there can be little doubt that, whereas in the early days of national health insurance most insurance practitioners thought it their duty to make themselves familiar with the official drug tariff, more recently little attention has been paid to this, and most practitioners are now almost wholly unacquainted with its peculiarities. Such want of knowledge is not blameworthy on scientific grounds, but on economic grounds it is unfortunate. This last circumstance, at any rate, is remediable; and combined action on the part of Insurance Committees and Panel Committees—such as that, for instance, which has recently been taken in Smethwick by the issue to practitioners of an admirable memorandum on the subject—is to be commended and encouraged. A revision of some of the anomalies of the tariff itself, and, more remotely, some regard for economic considerations in the official inclusion of preparations in the *British Pharmacopoeia*, would also be of service.

It is unfortunate that somewhat hurried action should have had to be taken by the Ministry of Health to meet an emergency in this matter. It is still more unfortunate that the resulting agreement should have been fixed for six years. We can only hope that all concerned will combine to reduce its manifest disadvantages.

## PROHIBITION THROUGH THE AGES.

Dr. L. Lewin of Berlin, who is justly famous for his knowledge of the history of drugs and poisons, published some time ago a treatise on habit-forming drugs, to which he gave the rather whimsical title *Phantastica*.[1] He has now published a second edition which contains his latest views. The subject is rather bewildering both in extent and variety, but the chief impression produced by the perusal of his essay is one of astonishment at the ingenuity displayed by men in all ages, and at every stage of civilization, in finding drugs to stupefy and confuse their brains. We are led through all sorts of strange passages of history, and into all the out-of-the-way corners of the earth. The fly agaric is suggested as the cause of the berserk rage of the Vikings, and atropine as the probable source of those delusions that brought so many witches to the stake. In the chapter on alcohol the author relates a few instances which he thinks prove the profound effect the drunkenness of monarchs has had on the course of history. Dr. Lewin discusses all the ordinary drugs of addiction used by Europeans, and gives details of others less well known. We have a short history of each drug, an account of its sources, of the action it produces on the individual, and of its sociological influence.

The spread of drug habits and the fate of the measures designed to abolish them make an interesting story which, it must be confessed, provides little comfort for would-be reformers, since it is a record of unbroken failure. The prohibition of alcohol has been acclaimed as one of the great social experiments of the twentieth century, and it is interesting to learn that Charlemagne issued drastic edicts, but they were ineffective. Some of the ancient laws did not fail for lack of vigour. For example, in 1378 the Emir Soudoun Sheikhouni determined to stop the consumption of Indian hemp, and ordained that all hemp plants should be destroyed, and that all habitués should be imprisoned and have their teeth torn out. Indeed, the history of every common habit-forming drug is crowded with the recital of strongly worded interdictions that periodically have been launched against its use.

In the case of alcohol Lewin concludes that "not one of the penalties and prohibitions enacted since earliest times against drinking and drunkenness has had even a general, half perceptible, success." On the other hand, he relates many instances of the queer results that have followed attempts to interfere by legislation with the habits of a people. For example, the Presbyterian missions in Polynesia instituted a campaign against kava drinking; it was successful, but the natives took to alcohol instead—a far more serious scourge. It is perhaps unnecessary to add that Lewin is not optimistic regarding the success of prohibition in the United States, since he regards it as an experiment that has been tried and failed times without number.

Although he believes that it is impossible to abolish a deep-rooted custom or habit by repressive legislation, however Draconic, Lewin recognizes that there is a possibility of ameliorating the spread of such drug habits as morphinism and cocainism, which affect only a portion of the community, and depend upon a supply of drugs that could be abolished, or at least greatly restricted, by international agreement. He thinks that commercial interests have frustrated the efforts made in this direction at Geneva; he recalls Napoleon's saying, *Le commerce n'a pas de patrie*, and adds that much worse things could be said of trade, were its activities in regard to habit-forming drugs to be correctly and frankly described.

The essay is of great interest and value, because it gives a clear general picture of the drug habits with which mankind has afflicted itself. In particular its study is to be recommended to those who propose to modify these habits by legislation.

[1] *Phantastica.* Von Prof. Dr. L. Lewin. Zweite erweiterte Auflage. Berlin: G. Stilke. 1927. (Med. 8vo, pp. viii + 465. R.M.20.)

## THE SPECIFICITY OF SCARLET FEVER STREPTOCOCCI.

There were at one time good grounds for believing that the streptococci isolated from the throats of scarlet fever patients formed a homogeneous group distinguished by their serological and their toxigenic properties. It was hoped that by laboratory tests alone it would be possible to identify the origin of a given strain of streptococcus, and to ascertain what etiological relation it bore to the disease with which it was associated. Recent work, however, seems to render it more and more probable that the problem set by the streptococci is not to be solved so easily; these organisms are subject to considerable variation, and any attempt at rigid classification is likely to fail. Further evidence of this contention is afforded by a paper by Dr. D. G. S. McLachlan in the *Journal of Hygiene* (March 30th, 1927). Studying ninety-eight strains of haemolytic streptococci isolated from scarlet fever cases, he found that all but three produced a toxic principle capable of evoking a cutaneous reaction in susceptible persons in a dilution of 1 in 1,000; the three exceptions produced a reaction only when lower dilutions were employed—1 in 100 or 1 in 250. But, on the other hand, no fewer than five out of thirty-two strains isolated from non-scarlatinal sources produced a similar toxin active at 1 in 1,000, while six others out of the same series produced a toxin active at 1 in 100 to 1 in 250. These results appear to indicate that no hard and fast line can be drawn by means of estimations of toxigenicity between streptococci of scarlatinal and of non-scarlatinal origin. Nor do neutralization tests with immune serums

afford much help. Of ninety-eight scarlatinal toxins tested, eighty-eight were neutralized by a specific anti-toxic serum; of twelve non-scarlatinal toxins tested, eleven were neutralized by the same serum. Though the scarlatinal toxins appeared to differ among themselves, there was no indication that their neutralization by a specific serum differed in any way from that of the non-scarlatinal toxins. The author considers that these tests show that the scarlatinal streptococci are closely related to other haemolytic streptococci, and illustrate the difficulty of demonstrating satisfactorily that *Streptococcus scarlatinae* is a distinct variety characterized by specific toxigenic properties. Undoubtedly it would be easier to study this problem if only there were a suitable laboratory animal that reacted to cutaneous injections of streptococcal toxin. So far, with the exception of certain experiments on young goats, all tests of toxicity have had to be conducted on human volunteers. Various investigators, however, have stated that by artificial immunization laboratory animals can be sensitized to the toxin. Professor T. J. Mackie and Dr. D. G. S. McLachlan[1] were able, by repeated injections of living organisms, to produce cutaneous sensitiveness in guinea-pigs to scarlatinal toxins. But further investigations showed that the reaction occurred only when high concentrations of toxin were used; that the reaction was generally mild; that the active principle in the filtrate was not inactivated completely even after three and a half hours' exposure to a temperature of 100° C.; and that the sensitive state was not specific. They conclude that the skin reaction in sensitized guinea-pigs is not definitely comparable with the Dick reaction in persons susceptible to scarlet fever.

[1] *Brit. Journ. Exper. Path.*, 1927, viii, 129.

## VISCERAL MANIFESTATIONS OF TERTIARY SYPHILIS.

IT is interesting to note the swing of the pendulum of medical opinion on visceral manifestations of tertiary syphilis. In a note published on May 7th (p. 835) Mr. Rodney Maingot, in recording a case of gummatous colitis, called attention to the change of attitude in the medical profession towards syphilis of the large intestine. The syphilitic, he said, used to be regarded as one of the commonest forms of intestinal stricture; opinion has now swung round almost entirely to the opposite view. In a recent communication to l'Académie de Médecine (March 1st) Drs. Emile Sergent and R. Benda mention the oblivion from which Dr. Letulle has recently drawn pulmonary syphilis, and with this introduction describe their observations on tertiary syphilis in the lesser bronchial tubes. They are convinced that some of their cases showed bronchial sclerosis solely due to syphilis, while others were possibly open to the interpretation that they were due to tuberculous disease in syphilitic subjects. In the first group there were eight cases in which syphilis was evident and tuberculosis could be ruled out; thorough examination was made for traces of other diseases; but the only case of doubt in the group was a man who had been gassed in the war. In the eight cases of the second group, although syphilis was present and the bacillus of Koch could not be found, the occurrence of haemoptysis, and the discovery of nodular foci on *x*-ray examination, prevented the exclusion of tuberculosis. In confirmation of their views the authors call attention to the recognized predilection of syphilis for the large bronchi; the frequency of the origin of dilatation of the bronchi from syphilis; and the predominance of lesions in the bronchioles in pulmonary syphilis. Drs. Sergent and Benda speak of syphilitic sclerosis of all the viscera as being generally admitted; they also regard it as uncontested that syphilitic antecedents are frequent in the subjects of tuberculous fibrosis. They conclude that in any discussion of syphilis of the respiratory tract consideration should be given to disease of the middle and smaller bronchi, and that this form of the disorder should be distinguished from syphilitic bronchiectasis. As the affection is not fatal, autopsies in chronic syphilitic bronchitis are rare; but the authors express the hope that the condition will be sought for during *post-mortem* examination of old specific cases, such as those with manifestations of tabes or aortitis.

## NATIONAL HEALTH INSURANCE AMENDMENTS.

TWO months ago we drew attention (JOURNAL, June 18th, p. 1116) to the fact that the Government was considering the introduction, either in the autumn session this year or early next year, of a bill to amend the National Health Insurance Acts in some important particulars. During the past week it has been stated, apparently with authority, that this bill is now drafted, and that the proposals have been considered by the Ministry's Consultative Council of Approved Societies. Presumably, if the Ministry's Medical Consultative Council had been functioning, the proposals might have been submitted for its observations also. This, however, being obsolete, apparently with the acquiescence of all concerned, there are strong reasons why the proposals should be placed before the Insurance Acts Committee and Council of the British Medical Association. It is true, as stated in our previous note, that the approved societies insist on restricting the amendments of the Ministry to a relatively small field. However much the Ministry may wish to carry out the simpler, more urgent, and more beneficial of the recommendations of the Royal Commission, it is not to be allowed to do so. The Royal Commission, it will be remembered, unanimously recommended that an extension of medical benefit to include consultant and specialist services with laboratory provision was urgent, was "immediately possible," and would probably cost not more than a million and a half per annum; and that an extension to make dental benefit a statutory instead of an additional benefit was placed much further down on the list of desirable extensions. The possibility of carrying this recommendation into effect lies either in the Ministry and the Government insisting on it by legislation, or in the approved societies consenting thereto. It is understood that the societies have refused their consent; and it may be held by some that they are placing the conservation of their individual power and financial strength above the common interests of the insured population. However restricted, in these circumstances, the amending proposals of the Government may be, it is still possible that they may include suggestions some of which will require the co-operation of the medical profession, and certain that they must include proposals which will directly or indirectly affect its interests. An early consultation with the representatives of the profession is therefore desirable.

## INTERNATIONAL CONGRESS OF THE HISTORY OF MEDICINE.

ON July 18th, exactly two years after the Congress at Geneva,[1] the sixth international Congress of the History of Medicine opened at Leyden, where the meetings were held on that and the two following days; they were then transferred to Amsterdam, and the meeting ended on July 23rd. The Congress was formally opened by H.R.H. Prince Hendrik of the Netherlands after addresses had been delivered by the President, Dr. J. G. De Lint, lecturer on the history of medicine in the University of Leyden, and the delegates of the various countries. Nearly two hundred members in all were present from Austria, Belgium, Denmark, Egypt, Finland, France, Great Britain, Germany, Greece, Holland, Italy, Morocco, Norway, Poland, Portugal, Russia, Spain, Sweden, Switzerland, and the United States;

[1] See BRITISH MEDICAL JOURNAL, August 1st, 1925, p. 226.

representatives from Germany and Austria were present for the first time. Owing to the simultaneous meeting of the British Medical Association at Edinburgh there were only a few representatives from this country, but nearly all played an active part in the proceedings. Dr. Charles Singer, as the official delegate of the British Government, delivered an address at the opening ceremony; Sir D'Arcy Power took the chair on the second day and read a communication by Mr. C. J. S. Thompson, who was unable to be present, on Boerhaave's prescriptions for English patients; Dr. J. D. Rolleston contributed a paper on St. Blaise, physician and martyr, and was chosen by lot to propose the health of the ladies at the banquet. The outstanding personalities in the Congress were the veterans, Professor W. H. Welch of Baltimore and Professor Karl Sudhoff of Leipzig, who, by the active part which they played in the scientific and social life of the Congress, roused the admiration and envy of the younger members. Space does not permit even a brief account of the ninety odd papers communicated to the Congress. Suffice it to say that, while a considerable number dealt with Boerhaave and Dutch medicine, a great variety of other subjects were discussed. Among those that may be mentioned were those on medical folk-lore by Dr. van Andel; on St. Sebastian by Professor Sigerist of Zürich; on the gynaecologist Emil Noeggerath by Dr. Diepgen of Freiburg; on the evolution of medical philosophy by Dr. Delaunay of Le Mans; on Dutch students in Italian universities by Professor A. Castiglioni of Padua; on a Catalan plague tract by Dr. A. Klebs; on Dr. Oliver, the Bath physician, and the biscuit that goes by his name, by Dr. E. B. Krumbhaar of Philadelphia; and on the teaching of medical history in the United States by Dr. Victor Robinson of New York. The meetings were, on the whole, well attended, and the discussions animated. Special addresses were also given on the history of the treatment of nervous and mental disorders by Dr. C. U. Ariens Kappers; on the work of Leeuwenhoek and Swammerdam by Drs. A. Schierbeek and W. H. van Seters; on the doctors in Caricates by Mr. C. Veeth; and on the bier of the surgeons and druggists preserved in the church at Wokkum by Dr. J. B. F. van Gils. A collection of Dutch physical instruments of the seventeenth, eighteenth, and commencement of the nineteenth centuries was brought together in the physical laboratory at Leyden, where an excellent preliminary address was given by the assistant director, Dr. C. A. Crommelin, who showed contemporary portraits of Huyghens, Musschenbroek, and others. Credit is also due to Drs. Nuyens, de Feyfer, and van der Hoeven for their admirable collection of pictures, sculpture, books, and incunabula relating to medicine in the Municipal Museum at Amsterdam. It was only fitting that during the stay of the Congress at Leyden homage should be rendered to the memory of Boerhaave, who was the most eminent physician and clinical teacher of his age. Visits were paid to his tomb in the Pieterskerk, a memorial tablet was unveiled on the wall of the house where he died, and a wreath was placed on his statue in one of the principal streets of Leyden and an appropriate address given by Professor Welch. The social festivities, for which the organizing committee deserve the highest praise, included receptions by the burgomasters of Leyden and Amsterdam, by the Minister of Public Instruction at The Hague, by Mr. and Madame Fokker at Boerhaave's house, and a tour on the Zuyder Zee, including visits to Enkhuisen, where the members were entertained by the mayor and inspected the Surgeons' Hall, and to Volendam. A visit to the diamond-cutting factory was also arranged for the ladies, who were accompanied by several members of the Congress. The Congress terminated on Saturday evening with a banquet at Vondel Park, where speeches were delivered by the President of the Congress, Dr. Tricot-Royer of Antwerp (President of the International Society of the History of Medicine), and Dr. Capparoni, the President-Elect of the next Congress. This will be held at Rome in 1930, but in 1928 the International Society of the History of Medicine will take part in the Congress of Historical Science to be held at Oslo.

## INFECTIOUS DISEASES IN BULGARIA.

Bulgaria, owing to its geographical position, is exposed to the pestilences which come from the East. It has quarantine stations at Varna, Burgas, Svilengrad, and Rustchuk, together with thirteen health posts elsewhere. Infectious disease within the country, as stated in a recent paper, is controlled centrally by a director of public health, and locally by medical officers and sanitary inspectors, aided by provincial and district councils. For plague, cholera, small-pox, typhus fever, and relapsing fever hospital isolation is obligatory; for enteric fever, scarlet fever, and diphtheria it is not unusual; other infectious diseases are treated at home. In home isolation the house is placarded, access forbidden, and a gendarme or watchman placed on guard. There were two cases of plague in 1924, but cholera has not occurred since 1916. Small-pox has become comparatively rare. Vaccination in the first year of life is compulsory, and must be followed by two revaccinations, before the ages of 7 and 20 respectively. All contacts with small-pox must be vaccinated or revaccinated, and general revaccination, under conditions, may be imposed during outbreaks. In 1919 there were 8,746 cases of small-pox; in 1923 there were 20, mainly refugees and Turks. Typhus was imported from Serbia in 1914, and in 1917 there were 6,697 sick. Since that date its prevalence has declined, but in 1923 there were 413 cases with 51 deaths. Enteric fever is frequent in the poorer districts where wells are unprotected, flies numerous, and life in general unhygienic. Scarlet fever is widespread; in 1923 there were 15,585 cases, with a case mortality of 18 per cent. The type of disease is severe and its treatment inadequate. Measles is prevalent but generally mild, and diphtheria is sporadic. Rabies is endemic in Bulgaria among domestic and wild animals, and the number of people bitten is increasing year by year. In 1923 the antirabies section of the State Institute of Bacteriology at Sofia treated 3,429 persons, of whom 3,178 had been bitten by dogs, 101 by cats, 3 by wolves, 14 by human beings, and the rest by other animals. In zones declared infective rabid animals and their animal contacts are killed. Dogs must be muzzled and wear collars with identity badges; they must be kept on the chain at home and taken out on the lead; luxury dogs are heavily taxed, and all strays are killed; from fifteen to twenty people die each year of hydrophobia. Tuberculosis is not notifiable, but the annual mortality from all forms in fifty towns has recently ranged from 2.4 to 3.5 per 1,000. The disease has a rising incidence in Sofia, and is beginning to invade the rural districts. Its spread is ascribed to the introduction of schools and factories. Malaria is very common; it is not notifiable, but in 1922, of 23,863 school children examined in selected areas, 8,839, or 37 per cent., had splenic hypertrophy. Mosquitos thrive in this land of lakes and marshes. *Anopheles maculipennis* is widely distributed, and *Mysorrhynchus pseudopictus* swarms in places; *A. bifurcatus*, however, is rare. Curative quininization is intermittent, oiling is casual, and effective drainage on the large scale financially impossible. Venereal disease appears to be rife. During the war 14 per cent. of the army had syphilis and 20 per cent. gonorrhoea; many men at demobilization had to be sent home still infective. Epidemics of civilian syphilis are recorded. In one village 45 per cent. of the inhabitants were syphilitic; in another 62 per cent. In towns the disease is spread by the usual channels; in the country by the use of one common feeding bowl and drinking vessel at meals. There is no legislation

for venereal disease, but overt prostitutes are supervised. Bulgaria has a surface of some 40,000 square miles and a population of 5,000,000, of whom one-half are engaged in agricultural pursuits. It possesses various minerals, but their development is in its infancy. The country was gravely impoverished by the European war. Its public health service, as is to be expected under such conditions, is cramped by a shortage of personnel and equipment. Despite these bars progress has been made, as the above observations show, but what remains to do will present to the public health administration of Bulgaria a sufficiently formidable task.

## TRUDEAU SANATORIUM.

EXCEPTIONAL activity in all departments is recorded in the forty-second annual report of the Trudeau Sanatorium, at Saranac Lake in the Adirondacks, for the year ending September 30th, 1926. More patients were dealt with than in any previous period, and the increased number of the infirmary beds enabled many patients with advanced disease to undergo treatment. There was much renovation of the existing buildings, and the new animal house and bacteriological cottage were completed and opened; additional roads were constructed, and the general equipment of the hospital was much improved. The work of convalescent patients was considerably extended, and proved a very valuable factor in their treatment. Publication was begun of a series of books containing the results of the clinical observations of physicians connected with the Trudeau Foundation. Of the results of a prolonged study of intestinal tuberculosis contained in a volume prepared by Dr. Lawrason Brown and Mr. H. L. Sampson, roentgenographer of the sanatorium, some account was given recently in our columns (February 5th, 1927, p. 242). The second book of the series related to the diagnosis of tuberculosis by laboratory methods; it was written by Drs. E. R. Baldwin, S. A. Petroff, and L. U. Gardner, and appeared early this year. The forty-second annual medical report of the sanatorium is published separately, and appended to it are the pathologist's report and the tenth collection of the studies of the Trudeau Foundation for research and teaching in tuberculosis. It is stated in it that *x*-ray examinations have been made of the 1,200 school children who live at Saranac Lake, with a view to determining the age at which pulmonary tuberculosis begins. Further attempts have been made to immunize guinea-pigs; it has been shown that as few as five tubercle bacilli can produce tuberculosis in a normal guinea-pig, and it is suggested that when testing immunity the usual injection of 80,000 to 100,000 bacilli is too high. Other subjects dealt with are the diagnostic and prognostic significance of pleurisy in phthisis, and the progression of tuberculous lesions in the lungs. A modification of the Ziehl-Neelsen method of staining tubercle bacilli is described. The claim is made that by its use there is an increase of 5 per cent. in the positive results of the examination of sputa, the bacilli appearing larger and more deeply stained, while beaded and hair-like forms are scarcely ever seen.

## SMALL-POX.

SIGNS are not wanting here and there in England that the respect of the public for the grim type of small-pox which is so prone to kill or disfigure has been appreciably reduced in recent years through the local prevalence of a milder form with an almost negligible fatality. The name of small-pox in the ear of many is beginning to lose its formidable sound. As fear is relieved the need for precaution is lost sight of, and the claims of vaccination as a safeguard against the disease are slighted or passed by. This attitude, however, is quite mistaken. The prevalence of mild small-pox implies susceptibility also to the severer type, and, rightly understood, should serve as a warning that the need for vaccination is as great as ever. It is important that the public should realize the situation, and that the medical profession should be prepared. The appearance now of two publications on small-pox by Dr. W. M. Wanklyn is therefore well timed. One of these prints, entitled "To whom it may concern," is a popular address on small-pox and vaccination. It describes the aspect of the disease, citing tragic instances, shows how it spreads and implicates whole families, quotes the figures of small-pox mortality in England from 1841, indicates the need for prompt action, and points the value of vaccination. The other print, "The accurate diagnosis of small-pox," is the third edition of a post-graduate lecture. It impresses the importance, to the doctor confronted with an obscure case, of bearing in mind the possibility of small-pox. It deals with the initial rashes and the crusting stage. It discusses maturation and the prostration of onset, and concludes with the statement that, however the rash may be mitigated in its severity, its relative distribution as between face, trunk, and limbs is constant in all cases. The popular print, "To whom it may concern," is recommended to the persons indicated. It puts the position as it really is, in a straightforward and vigorous manner. The post-graduate lecture is recommended to medical men, both general practitioners and health officers. It contains useful hints for those hours of trial in which reputations are made or marred.

## MR. ALBAN DORAN.

MR. DORAN'S many friends will regret to know that he had to undergo an operation for the relief of acute glaucoma last week, and now lies in his old hospital, St. Bartholomew's, where he became a student sixty years ago. Although in his seventy-eighth year, Mr. Doran's mind is as active as ever, and he recalls the fact that it was during the period of his house-surgeonship in 1872 that a ward was first set aside for ophthalmic cases. Sixteen years ago, on retiring from consulting practice, Mr. Doran gave his voluntary services to the museum of the Royal College of Surgeons, where he prepared a descriptive catalogue of surgical instruments, which will long remain the standard treatise on the history of surgical invention. In the museum, too, there are many mementos of him, particularly the splendid collection of auditory ossicles which he made while assistant in the museum under Sir William Flower. He also assisted Sir James Paget in the compilation of the pathological catalogue, now being again revised by Mr. Cecil Beadles and Mr. T. W. P. Lawrence. Mr. Doran has been an investigator and student all his days, and there are few professional men who possess his breadth and depth of scholarship. Our readers will hope for an early recovery; meantime they will be glad to know he is receiving the utmost attention and kindness from his old hospital.

WITH very deep regret we announce the death, on August 15th, at the age of 65, of Dr. Harvey Littlejohn, Professor of Forensic Medicine in the University of Edinburgh. He had been ill for some time, and was unable to take the chair at the Section of Forensic Medicine at the Annual Meeting at Edinburgh last month.

[1] PROFESSOR R. T. LEIPER, F.R.S., Director of the Division of Medical Zoology in the London School of Hygiene and Tropical Medicine, whose successful researches into bilharziasis in Egypt are well known, has been invited by the Egyptian Government to continue them next winter, and to advise on the best methods of combating the disease.

# THE CULT OF WATER CURES IN GERMANY.

Tower at Rothenburg.

FOR the average Englishman his holiday is an opportunity of rest and change from his work. With the German it is different, to judge from the number of "health springs"—apparently well over one hundred—scattered throughout the country. Thousands of people flock to these springs annually, and utilize their holidays in the serious business of restoring their health. Their faith in the properties of the waters is such that in Berlin it has become fashionable to continue the cure by visiting the Zoo at breakfast-time, and drinking a glass of the accustomed water while inspecting the collection of animals. The spas are federated, together with sea-bathing resorts on the North and Baltic seas, and so-called air-cure-spots, under the Allgemeiner Deutscher Bäder-Verband of Berlin. The equipment of all the spas is very complete, and mostly up-to-date; so that a large range of diseases can be treated, although each place specializes in accordance with the constituents of its waters.

*Aachen (Aix-la-Chapelle).*

Aachen, being close to the Belgian frontier, is easily reached through Antwerp and Brussels. It is a commercial and industrial town of 150,000 inhabitants; but the Quellenhof hotel, with extremely well appointed baths attached to it, and the Kurhaus are situated in a large garden, cultivated and wild, in a quiet spot on the edge of the city. As a spa, Aachen has suffered recently from three causes—the occupation by the Belgians, the Separatist movement, and its former reputation for the cure of syphilis. Its hot sulphur waters are said to be of about the same temperature as the waters at Carlsbad. They are used for rheumatism, skin diseases, gout, and late syphilis. It is stated to have been shown by experiment on animals that the sulphur can penetrate the skin, and blacken bismuth in the subcutaneous tissues. Douche massage is considered at Aachen to be given best by an attendant in the bath with the patient, the douche nozzle being controlled by the attendant's finger. The method of Hauffe of Berlin is in use for cases of high blood pressure. Some portion of the patient is inserted into an arm bath, a sitz bath, or a leg bath, and the temperature is gradually raised to a high degree by adding hot water through a funnel leading to small perforations in the bottom of the bath. The swelling of the limb induced by the heat is believed to deplete the internal organs and lower the blood pressure. It is suggested that bi-weekly repetition of the treatment will keep the blood pressure permanently reduced. The equipment at Aachen includes mud baths, ultra-violet light, electric baths, a Zander institute, and an inhalatorium after the fashion of Ems for nasopharyngeal treatment. Patients unable to move are lowered into the bath in an invalid chair, worked by somewhat nerve-racking machinery. An attraction of the cure at Aachen is that bathing facilities are attached to the main hotels.

Mergentheim.

*Bad Kreuznach.*

Kreuznach is situated on the river Nahe, near its junction with the Rhine. The wines of the Nahe district are very good. Those who prefer water can drink from the Elizabeth spring, and bathe in radio-active brine. Kreuznach claims to have been the first place at which radium-emanation therapy was applied as a recognized method of medical treatment. The radio-activity is said to be derived from the porphyry in the fissures and crevasses of the neighbouring cliffs, and to contain in concentration a proportion of 100,000 Maché units, "fifty times that of the strongest radium spring in the world." In the valley near Kreuznach are the *Salinen*, where the brine is concentrated for the production of "mother lye" and salt. Kreuznach also bottles its radium water. The list of diseases treated at Kreuznach is a long one, ranging from gout and scrofulosis (a term of frequent use in Germany) to skin diseases, heart diseases, and the diseases of old age. The waters are supposed also to encourage the libido sexualis. In fact, the view taken locally is that Bad Kreuznach is an ideal resort for everyone. Like Aachen it is open all the year round, with a main season from May to October.

*Bad Münster-am-Stein.*

Münster-am-Stein is a charming little place close to Kreuznach, and a few miles higher up the River Nahe. It lies between the Rheingrafenstein rocks and the hills called Rotenfels. Its waters are the same as those of Kreuznach; in fact, the saline works from which Kreuznach produces its mother lye originally belonged to Münster-am-Stein. The bathing establishments were rebuilt in 1911, all the baths being now supplied direct from the springs with water which does not require artificial heating. In addition to natural thermal radium acid baths, mud baths can be obtained, composed of radio-active spring sediments. In the radium emanatorium patients breath the gases of the springs.

*Bad Mergentheim.*

Unlike so many German spas, which are owned partially or wholly by the State or municipality, Bad Mergentheim belongs to a private company, which owns the baths, kurhaus, gardens, and four hotels. Each hotel has its own bathing establishment and equipment, and a resident physician. All the hotels are run as hotels, with freedom for the guests, and not as sanatoriums. But in the Hotel Kurhaus the hotel element predominates; while in the others, such as the Kuranstalt Hohenlohe, under the capable management of Dr. Leopold, the medical supervision is more thorough. Patients in boarding-houses and certain sanatoriums go to the Kurhaus hotel baths for their treatment. Bad Mergentheim is the German substitute for Carlsbad. Its waters are suitable for diseases of the liver and gall bladder, for gastro-intestinal diseases, for diabetes, and for obesity. Six different menus are provided in the hotels to suit different patients; and these diets are supervised by the resident doctors. Mergentheim is an ancient and interesting town, situated on the banks of the Tauber, and was once the home of the German knights. The delightful mediaeval town of Rothenburg is within easy reach; and Würzburg, the castle

of Hohenlohe, and the cloister of Bronnbach can be visited. Mergentheim is a quiet spot, amidst beautiful scenery; with an able director, Herr Hengst, who has been connected with hotels in London and Cairo; and there is, perhaps, more efficient supervision of the patients than is usually the case.

*Baden-Baden.*

As a bathing resort Baden-Baden, on the river Oos, suffers from the fame of its social attractions. It has been called the "Eden of Central Europe" and the "fashionable meeting-place of the élite from all parts of the world." It is a well laid out and well kept town, situated amidst the dark pine-covered hills of the Black Forest, where the wealthy can live in luxury, indulge in a little mild gambling, and, when not too much exhausted with the round of pleasure, can drop into the Friedrichsbad or the Augustabad, and experience the sensation of a "wildbad" or "bain sauvage." This name is derived, apparently, from the fact that the patient sits in a shallow bath on a bed of sand, through the middle of which the warm water flows in. The flow of water keeps the sand clean; the sand retains the heat of the bath. The use of this bath is often combined with a prolonged process of Turkish and steam baths, massage, showers, cold plunges, and, if necessary, some Zander exercises. There is accommodation for the taking of a wildbad by family parties. The baths are under the State; the municipality runs the outside attractions; the hotels are private companies. The bathing establishments are well appointed and under the control of a very capable chemist and engineer, Dr. Baur; but one is left with the impression that the baths at Baden-Baden are only one of many side-shows, less closely connected with the life of the spa than is usually the case. Baden-Baden treats rheumatism and gout, and also provides a grape cure for constipation and obesity at the end of August and in September. Owing to the mildness of the climate the season is perennial.

*Wildbad.*

Though Wildbad seems to possess more "Princes' baths" than most spas, and its bathing establishment is richly decorated in Oriental style, it takes its treatment more seriously than Baden-Baden. It is a little town situated in the Black Forest, in the midst of magnificent scenery, on the banks of the river Enz. Here the rheumatic patient can devote himself to his wildbad, with water coming from the earth at a temperature of 94°. The effects of the water are attributed merely to its being thermal. There is nothing noteworthy in its composition, there is less radium than in many waters, and it is not thought that drinking the water is of much use. Bathing is the only important thing. The patient feels worse for the first few days of treatment, and then begins to improve; and in twenty-nine days progress is complete as far as it is possible. For nervous and excitable people it is considered better that the water should be lowered 2° in temperature by storing overnight. The visitor to Wildbad has no excitements beyond the band, the scenery, a beautiful park, and much trout fishing.

*Bad Reichenhall.*

Reichenhall, situated in the Bavarian Alps, not far from the Austrian frontier, has perhaps some of the most beautiful surroundings of any spa in Germany. It was known for its salt works in Roman times; but as a bathing place it only dates from 1845; and as this town was completely burnt down last century, no old buildings remain. The springs vary greatly in strength, but some contain as much as 24 per cent. of salt. Owing to its climate and its scenery Reichenhall is prepared to treat a large variety of diseases, and equipment exists for all sorts of methods, from sun baths to Storm van Leeuwen's filtered air. The main treatments, however, are by brine baths and by compressed air. Consequently the diseases treated are chiefly those of the organs of respiration, such as asthma and emphysema, heart disease, and some diseases of women and children. The pneumatic chamber installation is very complete; and further respiratory treatment is obtained by inhalations and by promenades in the neighbourhood of the salt-evaporating works.

*Bad Elster.*

Elster in Saxony is a middle-class watering place, consequently it has many *heims* or homes for black-coated insured persons and for krankencassen patients. Prices are reduced for some 3,000 patients a year. It has a very fine modern bath-house, a new wing to which has just been opened. The waters contain iron and Glauber's salts, and in some cases natural carbonic acid gas. Radio-active waters are also in use, but these are obtained largely from the neighbouring spa, Brambach. A specialty is made of mud baths; and in the neighbourhood of Elster there are large flats of used mud, which are intended to be made use of again in twelve years' time. The diseases treated are chiefly anaemia, sundry diseases of the internal organs, and women's diseases. A short distance from the town there are open-air swimming baths for men and women, and for mixed bathing. There is in Elster a very well run sanatorium owned by Dr. Köhler.

*Bad Brambach.*

At Brambach near the Czechoslovakian frontier a new spa has been founded. Like Mergentheim, the establishment is under a private company which runs the baths and hotels. The waters are said to be highly radio-active; and under an agreement Brambach has to furnish a daily supply of radium water to Bad Elster. Because, possibly, of its newness the establishment was not very impressive, and the close odour in the hotels did not add to the attraction of the place.

SANATORIUMS.

The observer of German cure places will be struck not only by the completeness of equipment at the spas, but also by the facilities offered for other forms of treatment. Thus throughout Germany there are many sanatoriums, establishments to which the nearest approach in this country are Ruthin Castle, the New Clinic in Windsor Forest, and perhaps some of the hydropathic establishments. As examples of such sanatoriums we may take Bühlerhöhe near Baden-Baden, Dr. Köhler's sanatorium at Bad Elster, and Dr. König's clinic for asthma in Reichenhall.

The Sanatorium Bühlerhöhe is situated high up in the Black Forest, and is a palatial building originally erected as a home for a dozen retired army generals. It now accommodates some fifty visitors, with a new wing for thirty-five more. The sanatorium itself is a clinical establishment in which all the patients are under medical discipline. In the Kurhaus diagnosis and treatment are available from the resident doctor; but for those who do not need medical attention it is a place of recreation. All internal diseases and nervous diseases are treated; very little seems to be excluded except infectious disease and insanity. Diet, hydrotherapy, sun and air baths, inhalation, massage, electricity, and gymnastics are used in treatment. The cost for board and lodging is from ten to seventeen marks a day, with an additional charge of 20 per cent. in the summer season. The medical fees are fifteen or twenty marks for the first examination, and thirty marks every ten days for daily visits or consultations. There are other hotels and sanatoriums under the same direction at St. Blasien and Schinznach.

Dr. Köhler's sanatorium at Elster is more definitely linked to spa treatment. It consists of several villas with equipment for baths and for electric, ultra-violet, gymnastic, orthopaedic, inhalation, dietetic, and psychic treatment. Attached to Dr. Köhler's sanatorium is an open-air establishment for poor children suffering from scrofulosis. This home was started with a donation from the Save the Children Fund. The children live in a state of nudity exposed to sunlight and open air.

Dr. König's private clinic at Bad Reichenhall is arranged for treatment by the system invented by Professor Storm van Leeuwen of Leiden. The principle is to keep the patients, at all events for the night, in airtight chambers erected in their bedrooms, through which dried and purified air is pumped. The so-called fresh air is collected through a large galvanized iron pipe erected amongst the chimney pots. This air is conducted to the basement of

the sanatorium, where it is dried over ice, filtered (presumably of soot from the chimneys), treated for the removal of halogens—also derived largely from the home fires, we imagine—and then conducted in pipes throughout the house into the closed chambers and one sitting-room. Doubtless the process removes from the air pollen and other particles, and so relieves the symptoms of hay asthma while the patient is hermetically sealed up. But why the symptoms do not return during the daytime, when the patient wanders in the streets of Reichenhall is not clear. Even if spore-proof mattresses are provided while the patient is in the clinic, it does not seem to be known what happens if he subsequently drifts into an ordinary hotel. As an article by Professor Storm van Leeuwen, describing his method, is to be published shortly in the Journal, the matter need not be pursued here. It has only been introduced to show the extent to which unusual forms of treatment are made available.

### Summary of Spa Treatment.

It is evident that the facilities for treatment in Germany are very complete. The establishments, whether bath-houses, sanatoriums, or hotels, are well appointed and equipped; and the charges, particularly for travelling and in the hotels, are not high. The sanitation seems good. Social amenities and amusements are numerous, and the surroundings of most of the spas are beautiful. The treatments that can be obtained are very varied, and in most cases facilities exist for more or less extensive clinical examinations. There seems to be a tendency to standardize the equipment of the establishment, so that while at Ems, for example, inhalations and nasopharyngeal treatment are the special feature, and at Reichenhall a great display is made of pneumatic chambers, such specialization does not prevent the use of most other forms of treatment. Thus mud baths can be obtained at quite a number of spas, and if the orthodox volcanic mud is not available, there is probably a moor in the neighbourhood from which a sufficiently presentable peaty substitute can be brought.

The German spa doctor seems to use his treatment intelligently. He is naturally prepossessed in favour of the water of his district; he is inclined at times to overestimate its effects. In many cases he is not particularly given to self-questioning as to the rationale of his treatment; on the other hand he has discarded many of the less justifiable allegations of effects formerly attributed to water cures. He is ready to admit the value of the psychological results of regimen and environment on the patient. After all, the "health-springs" have been kind enough to choose as their outlet from the earth some of the earth's best beauty spots. If the seeker after rest and change finds it necessary to vary the enjoyment of scenery with the definite pursuit of health, the provision of water and mud baths, light cures, Zander exercises, and inhalatoria for gases from radio-active springs may well add to the benefit he receives. The advantages of these forms of treatment do not seem to require the same amount of confirmation as may be thought necessary in the case of the fresh air taken from amongst the chimney-pots.

### General Impressions of Germany.

A few general impressions derived from a tour in Germany may be recorded. It would appear that economic conditions are rapidly improving. Poverty is not visible, though it is said that many in the middle classes who drew incomes from investments were wiped out during the period of inflation. What has happened, apparently, is that, having lost their savings, those who were fit for it have taken up various occupations. Everyone seems to be working fairly hard, though there is some resentment that the products of this labour should go to satisfy the demands of the Dawes plan. During a visit to a factory two points were noticed. Some work, which looked as if in America it would have been done by machine, was being done laboriously by hand; secondly, all the workmen had a surly and somewhat dissatisfied appearance. Both these impressions may have been erroneous. At the spas the average German is a cheerful person, by no means as fat as he used to be represented. In fact, the typical fat German *frau* seems to have disappeared. She has become short-skirted and shingled, like the women of other countries, though shingling is by no means so universal as in England. The number of Germans who speak English is very large, and it was startling to meet a German doctor who had never been in England, yet spoke perfect English and had read the whole of Shakespeare twice, many of the plays five times, knew Mrs. Gaskell's *Cranford*, and quoted Byron at length.

It is quite rare nowadays to meet any German in uniform, except policemen and sweeps in top-hats. One of the most complete changes brought about by the war must have been the disappearance of universal conscription. Probably the average German is rather pleased at being relieved of the obligation for service; apparently he is turning his attention more to sport. Some games, however, do not seem to attract the German, and golf is mainly an amusement for foreigners. To the visitor there is little evidence of the existence of restrictions to his freedom, notwithstanding the number of police regulations that are supposed to exist. It is true that in Reichenhall smoking is *verboten* in many unexpected places, but the prohibition is probably intended for the comfort of the bronchitic and emphysematous patients.

The German is quite ready to talk about his aspirations. He feels very keenly about the Danzig "corridor," and is quite convinced that it has got to be abolished. He is equally convinced that Austria will not be able to stand without him, and must come into his republic. He does not appear to want either the Kaiser or the Crown Prince back, but large numbers of the South Germans are said to be in favour of the return of Prince Ruprecht. As it is felt that the German must have room in which to expand, there is a slight hope that England may restore some of the German colonies; but as this hope may be doomed to failure it is regarded as possible that the German may set about developing Siberia, in order to make it a second Canada. In the meantime it is said that quite a number of Germans are emigrating to the colonies of other countries.

# Union of South Africa.

[From our Correspondent.]

### Hospital Survey Committee.

Reference was made on March 26th (p. 591) to the appointment by the Minister of Public Health of a committee to make a hospital survey of the Union, and to investigate the hospital requirements of each of the provinces. The committee consisted of Sir Edward Thornton, Director of Medical Services, Union Defence Forces, and assistant health officer for the Union—chairman; Dr. A. H. Louw, superintendent of the Pretoria General Hospital; Mr. J. R. Booth, secretary of the Kimberley Hospital; Mr. R. F. Smithers, Public Service Inspector; and a lay representative in each of the four provinces, nominated by the administrator of the province. This committee's report has now been published. It confirms the finding of the Hospitals Committee appointed two years ago—that the accommodation at most public hospitals is utterly inadequate, particularly in regard to provision for the coloured and native races. The shortage of hospital beds in the Union now is even greater than it was in 1925; only in Johannesburg has there been any appreciable improvement.

There are in the Union at present one and a half million Europeans and six million non-Europeans. The population is most dense in Natal, with 44 to the square mile, and least so in the Orange Free State, with only 13 inhabitants to the square mile; Transvaal has 21, and Cape Province 17 inhabitants to the square mile. In South Africa the density of the population is not a good indication of the amount of hospital facilities required. This depends very largely on the constituent elements of the population. The raw native living in the heart of Natal or the Transkei obviously does not require the same proportion of hospital bed accommodation as the European, and even among Europeans the demand varies. The old Boer on the farms has a fearful distrust of hospitals; thus the demand for

European hospital accommodation is relatively small in the Orange Free State, whereas in farming communities composed mostly of members of the other dominant race the demand is large. Only along the mines of the Witwatersrand can the hospital accommodation provided for natives be considered reasonably adequate. Fairly good hospitals are also maintained by some of the sugar estates in Natal, and by the diamond mines and larger collieries. The Witwatersrand mines are required by law to provide one bed for every forty natives employed; this is not unreasonable, as the committee found that over 2 per cent. of the average number of natives employed are constantly in hospital. On the Natal sugar estates hospital accommodation is required in the proportion of one bed for every 200 employees.

Since the demands vary so greatly in different parts of the Union, the committee recommends varying ratios of bed accommodation to population for Europeans and non-Europeans in different parts. It recommends the division, for hospital purposes, of each province into a number of central hospital areas—the province of the Cape of Good Hope being divided into six such areas, and the provinces of the Transvaal, Natal, and the Orange Free State each into two. The ratio of bed accommodation to population to be aimed at in the public and private hospitals for acute medical and surgical cases, and maternity provision, is shown in a table. For non-Europeans the ratio is one to 700 of population in the whole of the Union except the Cape Western area—in which the non-European population consists largely of Eurafricans, whose degree of civilization often approaches closely to that of Europeans; for this area the ratio given for non-Europeans is one bed for every 375 of population. For Europeans the ratio of desirable bed accommodation to population arrived at varies from one for every 200 in Natal to one for 350 in the Orange Free State. In the Transvaal and three of the Cape areas it is one for every 250; in the Cape Western area it is one for 275, and in the Cape Midlands one for 300.

The approximate total accommodation at present available in public and private hospitals for surgical, medical, and maternity cases—excluding the beds in military, prison, chronic sick, infectious disease, and mental hospitals—for all four provinces of the Union is 5,002 European and 9,113 non-European beds. The existing ratio of beds available for community use is given as follows for Europeans and non-Europeans, respectively, for the four provinces:

| | |
|---|---|
| Cape of Good Hope ... ... ... ... | 409 and 2,308 |
| Transvaal ... ... ... ... ... ... | 234 and 2,831 |
| Natal ... ... ... ... ... ... | 160 and 1,469 |
| Orange Free State ... ... ... ... | 846 and 7,603 |

For non-Europeans the actual ratio in all provinces therefore falls very far short of the theoretical ratio suggested by the committee.

Except at a few places, no medical or nursing service whatever is available for natives living under tribal conditions in the native reserves and locations. There the witch-doctors and herbalists flourish, teaching the people that sickness is the result of witchcraft, and that they alone are able to cure the sick. In times not so long past, when no breath of doubt interfered with his practice, the witch-doctor smelt out the supposed offender, the procedure generally ending in the toture by fire or stinging ants, and in the death, of the accused person—in addition to the confiscation of his cattle and property. The witch-doctor had great value in war, when he could bewitch the enemy and give invincible power to his tribe, enabling them to overcome even the white people. Where tribalism continues the power of the witch-doctor has been little interfered with. The only serious effort to break down his influence was made by Sir George Grey in 1858, when he founded the Grey Hospital in Kingwilliamstown; this was intended to be one of several hospitals in the native areas of the old Cape Colony. His scheme was, however, abandoned when he left the colony. Since his time little attention has been paid to the personal health of the natives in the reserves and locations in any of the areas now forming the Union.

Apart from the punishment of serious crime, the collection of taxes, and the suppression of serious outbreaks of epidemic disease, the tribes have been left alone as long as they lived peacefully. Much private and public money has been spent in educating and bringing Christianity to these people, but their bodily health has been left largely to be cared for by witch-doctors and herbalists; the latter are officially recognized, and some 1,250 of them are still licensed by the State in Natal at £3 a head per annum. When the Kaffirs leave the native area at the call of the mining industry they are well cared for medically; large numbers are actually being treated in mine and other hospitals. These are chiefly Kaffirs who have left their areas for work, and who are unable, when ill, to proceed home. Dr. Morledge, in charge of a mission hospital in Zululand, emphasizes in a recent report the urgent need for native hospitals. He describes the torture that native women must still in many cases undergo during labour. All the neighbouring women crowd into the patient's hut. Some old woman may think that progress is not fast enough, and will then tie grass tightly about the abdomen or squeeze it with her hands; if this is ineffective she kneels or stamps on the patient. Needless to relate, death of the child and mutilation of the mother are common sequels. The committee expresses the opinion that the European section of the community has sadly neglected its duty to these people. It is convinced that the policy inaugurated by Sir George Grey, but long since forgotten, of bringing European medicine within the reach of tribalized natives would meet their great outstanding need, and all available native funds should be diverted for this purpose.

It has been suggested that the best way of achieving the desired end would be to give facilities for the training of natives as medical practitioners. Recently a committee considered the best methods of giving such facilities for training, should it be decided on. The qualified native practitioner is, however, rarely content to practise among his own people in their tribalized condition. Only last month grave embarrassment was caused in the administration of a public hospital by a native practitioner treating paying European female patients therein. The present committee is therefore convinced that the medical needs of the tribalized natives will not be met by providing for an influx of natives into the medical profession. It recommends the introduction of a system of dispensaries and hospitals, similar to that of French West Africa. While emphasizing the fact that they do not advocate the creation of a class of native practitioner with inferior medical qualifications, they believe that the problem in South Africa can best be met in the first instance by the training of a large number of native nurses and midwives. Such persons would then be available to carry European medicine to the heart of the native areas, and there would be created a number of health centres working for the benefit of the people. The committee urges that no new licences for native herbalists be granted, and that all existing licences be withdrawn in any district as native nurses and midwives are posted to such a district. The herbalists would then be entirely eliminated during the next five to ten years.

The report of the committee has been well received by the daily press. In the Cape it is described as an able and courageous document giving a more vivid and arresting account of the plight of the hospitals than did the report of the Hospitals Committee of two years ago. The public and Parliament should hear the truth this time in such a form that they would have to take notice. Its chief virtue lies in the businesslike way in which it sets down a reasonable and exact standard for hospital bed accommodation in the Union, and then applies that standard to the position in the four provinces, and in the various hospital units into which it divides the territory of each province.

### Leprosy Relief Association.

Mr. Frank Oldrieve, general secretary of the British Empire Leprosy Relief Association, has just completed a tour of the Union. He visited all the leper institutions and gave lectures in the larger towns. For the lectures he made use of a cinema film entitled "Leprosy—the Great Scourge," and numerous lantern slides. His best

meeting was held in the City Hall, Capetown, when several hundred people attended. That audience included thirty-five members of the First Moslem Division of the St. John Ambulance Brigade. In all his lectures Mr. Oldrieve was optimistic—rather more so than local experience warrants—regarding the results of modern methods of treatment and the possibility of eradicating the disease within a comparatively short period. Provided the cases can be discovered and treated in the early stages such eradication would appear to be reasonably possible. He proposes that compulsory segregation be discontinued and that treatment and isolation be made voluntary.

Mr. Oldrieve pays a tribute to the Health Department of the Union because of its policy of discharging non-infectious lepers from the institutions on probation. Since the Department of Public Health took over the administration of leprosy matters in 1923 a total of 1,026 such patients had been liberated from South African institutions. These arrested or "burnt-out" cases were no danger to the public. Segregation of infective cases was a sound policy, but far and away the most important was to get the early cases for treatment. Mr. Oldrieve has now left the Union for Rhodesia *en route* to England.

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Rheumatism was the cause of the chronic invalidity of 24 per cent. of London school children in 1926, as contrasted with 12 per cent. for tuberculosis. Additional provision for rheumatic children was established as from November, 1926, at Queen Mary's Hospital, Carshalton, in the form of a rheumatic unit of 60 beds for cases of primary acute rheumatism with temperature and acute local manifestations, but without chorea.

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* Continued from page 232.

1926. Eleven prosecutions against railway companies for smoke nuisance occasioned by locomotives were instituted, and eleven convictions obtained. The chapter entitled "Main drainage" deals, among other matters, with the conversion of hand-operated storm overflow penstocks on three main sewers to the tidal flap system, and flood relief works at a number of points. The chapter entitled "Housing" recounts the progress of the Council's housing schemes. Since the war, up to December 31st, 1926, the Council has completed 15,903 houses and flats, of which 4,643 belong to 1926. Since 1894 the Council has provided accommodation for about 178,728 persons in 25,874 tenements and houses, and three lodging-houses with 1,880 cubicles. The programme of work in hand comprises 15,000 additional new houses, apart from rehousing under slum clearance schemes.

### Central Midwives Board.

At the meeting of the Central Midwives Board for England and Wales last month, when Sir Francis Champneys was in the chair, the Standing Committee dealt with letters from the Worcestershire County Council and the Worcestershire City and County Nursing Association expressing the hope that the Board's form of keeping ante-natal notes would be simplified. The Board replied that in its opinion the training prescribed by the rules should give midwives the knowledge necessary to keep the notes indicated in the form approved by the Board, and added, that while the Board appreciated the fact that there are in practice some midwives who may not, at present, be able to keep all the notes prescribed, it hoped that any such midwives would receive adequate instruction in the matters in regard to which, at present, they lack sufficient knowledge. A communication was received from Tynemouth asking the Board to reconsider its decision to discontinue its approval of lectures at that place. The Board considered that its decision should not in any way prejudice the carrying out of the practical midwifery training at Tynemouth, and declined to alter it. A communication was also received from Dr. J. W. Thomson of Wakefield stating that the Board's decision not to approve lectures at Wakefield in future would hamper the Maternity Hospital, and might lead to the abandonment of the scheme to build a large maternity block. The Board, in its reply to Dr. Thomson, pointed out that its decision only applied to lectures, and would not in any way interfere with practical training. The Board has found occasion to call renewed attention to its memorandum pointing out that certificates submitted by candidates must not be tampered with in any way, but sent exactly as received.

## Ireland.

### Sale of Milk in Northern Ireland.

A bill to govern the granting of licenses for the sale of milk under special designations, now before the Northern Parliament, provides that no person shall, without a licence granted by the Ministry of Home Affairs, sell or offer for sale milk as certified Grade A, tuberculin tested, or T.T., or use any description or designation, including or resembling these. The fee for the licence and the period of its duration will be determined by regulation, and the Ministry will have power to suspend or revoke a licence at any time. Any person guilty of a contravention of the provisions of the bill will be liable, on summary conviction, for the first offence to a fine of two pounds or any greater sum not exceeding ten pounds, and for the second or any subsequent offence to a fine of five pounds or any greater sum not exceeding twenty pounds, and, if the offence is a continuing offence, to a further fine not exceeding two pounds for each day during which the offence continues. Any authorized officer will have power to take and submit for expert examination samples of any milk offered or exposed for sale. The expression "authorized officer" means any police officer or constable having authority to act as an inspector for the purposes of the Sale of Food and Drugs Acts, 1875 to 1907, and any person authorized by the Ministry of Home Affairs. A prosecution shall not be instituted except by, or with the consent of, the Ministry of Home Affairs. All fines recovered will be paid to the Ministry of Home Affairs.

### Candidates for Medical Registration Council.

In addition to the two candidates, Dr. M. R. J. Hayes and Dr. R. J. Rowlette, whose candidature for direct representatives on the Irish Free State Medical Council was approved by the medical organizations, Surgeon P. Hayden has entered the contest. Medical practitioners who have received voting papers are reminded that the latest date for their receipt by the Returning Officer is August 22nd.

## Correspondence.

### THE CONSTITUTIONAL FACTOR IN DISEASE.

Sir,—There appears to be a slight discrepancy in Dr. Hurst's extremely instructive address on the constitutional factor in disease, published in the Journal of May 7th. He states that the hyposthenic gastric diathesis occurs especially in individuals of the asthenic type with long chests and narrow intercostal angle, and that it is associated with a normal or low gastric acidity. He then states that achlorhydria is always, or almost always, present in Addison's anaemia, and gives an illustration of a patient suffering from that disease, with a short chest and wide epigastric angle—that is, a hypersthenic type.—I am, etc.,

Klang, Federated Malay States, June 28th. J. G. Reed.

***We referred this letter to Dr. Hurst, who replies as follows:

Sir,—Dr. J. G. Reed's letter concerning the type of individual in whom Addison's anaemia tends to develop raises a very important question. It is true that the hyposthenic gastric diathesis occurs especially in hyposthenic individuals with long chests and narrow intercostal angles, whereas the constitutional achylia gastrica which predisposes to Addison's anaemia is associated with a short chest and wide intercostal angle. In the past I have assumed that constitutional achylia gastrica is simply an exaggeration of the hypochlorhydria which forms part of the hyposthenic gastric diathesis. But, apart from the difficulty mentioned by Dr. Reed, it is a remarkable fact that in many cases of constitutional achylia gastrica the stomach is short and high, very similar to that observed in the hypersthenic gastric diathesis, and in striking contrast with the long and low stomach seen in most people with the hyposthenic habitus. Moreover, the achylia gastrica of Addison's anaemia is always absolute, and extreme hypochlorhydria, which occurs sometimes in normal individuals, as well as in chronic gastritis and in cancer of the stomach, is never seen in Addison's anaemia; the contrast has become very clear since the introduction of the fractional test meal, which may show a trace of free acid in one or more fractions in cancer of the stomach, but never in Addison's anaemia.

I am therefore inclined to think that achylia gastrica is a mutation rather than a normal variation from the average, like hyperchlorhydria and hypochlorhydria, hyperpiesia and hypopiesia, and is, as I first suggested some years ago, an inborn error of secretion, strictly analogous to Garrod's "inborn errors of metabolism," such as cystinuria, alkaptonuria, and pentosuria. The error is one of function and not of structure, as the mucous membrane is normal and shows a normal number of oxyntic cells, unless secondary gastritis has occurred.—I am, etc.,

Arthur F. Hurst.

New Lodge Clinic, Windsor Forest, Aug. 11th.

### RESULTS OF TREATMENT OF UTERINE CANCER.

Sir,—It is a matter of regret to me that Messrs. Berkeley and Bonney (August 13th, p. 284) are displeased at the method employed by me on page 101 of the report referred to. The more so, because I am grateful to them for their extremely valuable papers, which I have been able to use in the compilation of the report. I am not

responsible for the divisions into clinical classes made by the surgeons concerned, whose data have been merely taken from their published works. The foot-note was inserted for the express purpose of differentiating Mr. Bonney's figures from the others on account of the difference of basis. A separation of the figures can readily be made by any reader, with the sole result of a decrease in the size of the sample. In view of the foot-note it seemed hardly necessary to offer a separate table of Mr. Bonney's data alone, and equally it was impossible to exclude them.

On the second point I am indebted to Mr. Bonney for pointing out an obvious inaccuracy. I will not trespass on the hospitality of your columns with an explanation of the precise manner in which the error arose. One case requires deducting from the 72 being in class IV, all of which cases have been deducted throughout for reasons given, leaving a total of 71, and the number alive at 5 years should be 17. This error modifies slightly certain of the percentages in the text of the report (the modifications vary from 0.3 to 1.1 per cent.) which have been noted, and will be corrected if and when occasion offers.—I am, etc.,

London, W.C.2, Aug. 15th. JANET E. LANE-CLAYPON.

## VARIATION IN THE SEVERITY OF CROUPOUS PNEUMONIA.

SIR,—I am glad to see so eminent an authority as Professor J. A. Lindsay (August 13th, p. 283) referring to the variability in the virulence of infection in pneumonia and the consequent fallacies which this variability introduces when the value of different methods of treatment is being assessed. I should like to support Professor Lindsay's experience by a reference to a series of cases of lobar pneumonia which I had the opportunity to observe during the war. In two and a half years I saw 558 cases, with a mortality of 10.9 per cent. At one time 53 consecutive cases recovered, and were succeeded, after one death, by another 40 consecutive recoveries. All the patients were treated under precisely similar conditions, and were drawn, speaking generally, from a selected population.

Professor Lindsay's experience, though naturally relating to a smaller number of cases in hospital, is perhaps the more striking, because his patients must have been drawn from all sections of the population and, although spread over so long a period as two years, a number—presumably about 30—recovered, when the average mortality was, as he states, 20 per cent. I have previously referred in your columns (March 26th, p. 595) to this subject in pointing out that had I adopted some special or peculiar therapeutic measure at this particular time the credit for so exceptionally high a recovery rate would almost unavoidably have been given to such treatment. Yet at no time was any but symptomatic treatment employed. It seems impossible to envisage the opportunity of any one observer to test the effect of a particular form of treatment on a sufficiently large number of cases during a period so short that fluctuations in the virulence of infection could with confidence be eliminated.—I am, etc.,

London, W.1, Aug. 13th. ADOLPHE ABRAHAMS.

## THE PROPOSED NEW HOSPITAL POLICY.

SIR,—Mr. Groves, in his letter of August 13th (p. 285), says Dr. Flemming, in his letter of August 6th, asked if he had "overlooked the fact that the two great hospitals of this city have refused to unite in forming a common scheme for hospital reform." But this was not what Dr. Flemming asked. As Mr. Groves advocated State control of hospitals, Dr. Flemming suggested that Mr. Groves had overlooked the report of the Voluntary Hospitals Commission, which, it will be remembered, was strongly in favour of the voluntary principle in hospital policy being retained, as was also the Hospital Committee set up by the Ministry of Health which preceded it, and this policy has been repeatedly affirmed by the British Medical Association during the last seven years. Dr. Flemming states (he does not ask Mr. Groves if he recalls the fact) that, at a conference with a view to forming a joint committee to consider co-operation and improved organization of hospitals in Bristol, Somerset, and Wilts, two Bristol general hospitals, by the attitude they adopted, wrecked the scheme. I do not know exactly what that scheme was, but I doubt very much if it included actual amalgamation of any hospitals in this city, in distinction to co-operation in working. Mr. Groves states that the Voluntary Hospitals Commission made an attempt to bring about amalgamation of certain hospitals in this city. I think this is a mistake. I do not believe it ever concerned itself with the question of the actual amalgamation of two hospitals in this city, though no doubt it favoured all efforts at hospital co-operation and improved organization.

Mr. Groves expresses his great regret that amalgamation of the two large general hospitals in Bristol has not been brought about, and states that this is due to the refusal of the committees of these two institutions to agree to it. That is quite true. After the most careful and prolonged consideration—at any rate on the part of the committee of one of these hospitals—they came to the conclusion that, working in separate buildings, each hospital was best managed by a separate committee, and worked by a separate staff, and that the amalgamation of finance was practically impossible, as very large sums had been bequeathed to each separate institution. At the same time they are perfectly willing to enter into any scheme of helpful co-operation which will improve the working of the institutions or economize their expenditure.

Then Mr. Groves says we should not be content with our voluntary hospitals if only we had seen those of Toronto, Copenhagen, or any of the Swiss cities. No one doubts that it is possible to construct better hospitals than many of our present voluntary ones. No doubt the comparatively new King's College Hospital is much superior in construction to St. Bartholomew's, or Guy's, or the London Hospital, but it would not, therefore, be justifiable to scrap these older, but still very efficient, hospitals. As I said in my last letter, if all the old hospitals were rebuilt we should undoubtedly build better hospitals, but I asked, Are the existing ones so inefficient that it is necessary to abandon them? When at a meeting in London a few years ago a surgeon expressed the opinion that all hospitals built fifty years ago should be scrapped, Lord Knutsford, the chairman of the London Hospital, said "that if they followed changes in architectural fashions the London Hospital might have been entirely rebuilt three or four times, and even now be structurally out of date"; that was in 1922.[1] Probably the comparatively new King's College Hospital is already out of date as compared with the latest Canadian or Swiss hospital.

Mr. Groves thinks I have been "hard pressed" for reasons for opposing the country hospital. I have not been "pressed" at all; the reasons for replacing the city hospitals by country ones are clear and obvious. He suggests that it is really no advantage to have the hospital in the city, because even though there it may yet be several miles from the staff and students (he ignores the patients' relatives). But, granting that the staff and students live one or two miles from it on the outskirts of the city (certainly the patients' friends and relatives live in the city), it is clearly of much easier access to them than several miles away in the country, and most probably on the opposite side of the city to that on which the suburb in which they live is situated.

Then he says there is no room in the city to extend the existing hospitals on the pavilion pattern. But if he will take the trouble to re-read my last letter carefully he will find that I proposed that extension should take place in the form of country annexes with open-air wards. The nurses' homes attached to the city hospitals, at any rate in Bristol, are not in "noisy slums," but in quiet, airy surroundings.

With regard to specialization I am afraid Mr. Groves has misrepresented my meaning. As he expresses it, I am quoted as saying it does not matter that increased specialization is better for the patients, we must not have it because it will reduce the incomes of the staff. What I really pointed out was that if so many new specialists were

[1] BRITISH MEDICAL JOURNAL, 1922, vol. i, p. 760.

created, the scheme might prove unworkable, because even specialists must get sufficient income to live, and they might not if they were very numerous. A city can only support a very limited number of specialists, and if they were created in excess of this number the whole scheme would break down. I was only concerned with the amount of income made, because if it was insufficient for them to live on, as it would be if too many of them were created, the scheme would not work.

Mr. Groves says I raised a difficulty in the matter of the student's education "if all special branches of medicine and surgery are adequately equipped and properly staffed." I did nothing of the kind. I said if medicine and surgery were broken up into a number of subsections it might have a serious effect on medical education, which is a very different matter. I agree that the "undergraduate students of medicine must be taught the essential principles of their science and art by teachers and tutors, who combine to give an undergraduate curriculum"—it is indeed quite obvious—but I must point out that clinical teaching is one of the most important departments in that curriculum, and that the proposal further to subdivide medicine and surgery should be very carefully and critically examined in its bearing on clinical teaching.—I am, etc.,

Bristol, Aug. 14th. CHARLES A. MORTON.

## A TUDOR SANITARY RELIC.

SIR,—At Kelston in Somersetshire, about four miles from Bath on the upper road to Bristol, there lived in his great Tudor mansion the celebrated Sir John Harington, godson of Queen Elizabeth and translator of Ariosto. This witty and somewhat Rabelaisian courtier introduced into this country—or certainly into the great houses of this country—the water-closet. A rare pamphlet, *The Metamorphosis of Ajax*, describes in the broadest and most humorous terms his reasons for such an innovation, and gives a sketch of his own palatial edifice for its housing. His mansion was pulled down by Sir Caesar Hawkins, and only a few remains of one of the towers still stand, built on to the churchyard, but at the foot of a garden now the property of Mr. Spence of Kelston, and closely adjoining the site of the Italian garden of the ancient mansion, I discovered the remains of the famous "privy" house, which the present owner had carefully preserved, and which corresponds with the structure illustrated in the ancient pamphlet. To all sanitary authorities I think this information may be of interest.—I am, etc.,

London, W.1, Aug. 3rd. F. JOHN POYNTON.

## ONCHOCERCA GIBSONI AND ITS POSSIBLE TRANSMISSION BY SIMULIUM.

SIR,—Dr. D. B. Blacklock, at the end of his article in the BRITISH MEDICAL JOURNAL of January 22nd (p. 129) on "The insect transmission of *Onchocerca volvulus* (Leuckart, 1893)," suggests that possibly *O. gibsoni*, responsible for the production of worm-nests in cattle in Australia, might be transmitted by some species of *Simulium*.

As one of the principals engaged some years ago in the study of *O. gibsoni* (Johnston and Cleland), and in endeavouring to ascertain its possible means of transmission, I can state authoritatively that transmission occurs in districts entirely free, so far as careful investigations showed, from any species of *Simulium*.

In one experiment the transmitting agent seemed to be nailed down conclusively to a tabanid or a mosquito. In New South Wales transmission occurs on the lower Hawkesbury River, and abundantly on the north coast near Kew; in neither place has *Simulium* so far been detected, and a very close search has been made for all biting flies. In my experience over a wide area of Australia species of *Simulium* are not widely distributed. I have only met with them myself at Bumberry and on the Canoblas in New South Wales, on the Cooper in the interior of Australia, and near Hallett's Cove, south of Adelaide.—I am, etc.,

J. BURTON CLELAND,
May 28th. Professor of Pathology, University of Adelaide.

## REMUNERATION OF HOUSE APPOINTMENTS.

SIR,—I read with strong approval "House-Surgeon's" letter (August 13th, p. 285) urging that higher remuneration should be given to resident officers in hospitals.

When a houseman is appointed he has usually, as a student and after qualifying, devoted at least three years to clinical work, and is frequently a very competent medical man in spite of his lack of experience. He has been through an extremely long training which has, as often as not, drained the family finances.

It seems extremely unjust that a man with no financial backing should, when he has qualified, have to accept the appointment which offers him the most nearly adequate salary rather than that for which he is most suited, and which offers the best chance of his becoming a really skilled practitioner.

The less competent men quite rightly do not get appointments, and the remainder are often asked to accept only their keep in exchange for their whole-time services. Not only does the houseman agree to give up his whole time to the service of the hospital, but, with rare exceptions, he also identifies himself most loyally and whole-heartedly with the interests of the hospital. In many cases he does much routine and clerical work, which is of no profit to him professionally. Admittedly a resident officer is gaining experience. But so should any professional man at any time in his career, and still deserve more adequate remuneration than is given to the majority of housemen at present.

A scale with £150 a year as a minimum for a resident appointment seems to me reasonable.

I should further like to join with your correspondent in protesting against the pernicious practice of asking a large number of candidates to call—as it seems to me unnecessarily, and often at considerable expense—upon the honorary staff of a hospital.—I am, etc.,

August 12th. HOUSE-PHYSICIAN.

SIR,—From "House-Surgeon's" letter it is apparent either that he is very young indeed in his medical career or that he has overstayed his time in hospitals. He has yet to learn that the newly appointed house officer has gained a position of inestimable value to himself at a time when his actual value in knowledge and experience is in no way comparable with the theoretical value of his diplomas.

A year in hospital is as indispensable as any year of his student life; and yet, instead of being called on for the payment of fees, he is provided with free board and lodging and often an additional £50 or £100. The apparent inconsistency of a larger salary being offered by a smaller hospital is simply an expression of the law of supply and demand; for the larger and more important hospital provides a wider experience and a recognized status in the application for further appointments. Furthermore, the mere provision of board and lodging is certainly not a negligible asset, as your correspondent will eventually find when he passes out into the hard, cold world.

The necessity for interviewing candidates in all hospitals not attached to medical schools is so obvious as to need no elaboration. Its recognition by your correspondent must be only a matter of time. The British Medical Association has already done the hospital resident a noble service by securing the payment of fees for attendance at inquests. The regulation of salaries, however, is of much greater importance from two to ten years after qualification, and this fact has been recognized and is being acted upon by the Association. I am, etc.,

August 13th. M.B.

## "BLOOD PRESSURE."

SIR,—Over twenty years ago I purchased a sphygmomanometer. My colleagues looked on me as a faddist. I regularly took blood pressures, and mentally condemned some of my patients to an early grave: most of them are alive and well to-day. Nowadays every doctor goes about with a manometer in his kit. A good part of my time is spent in trying to undo the kinks in mentality brought about by patients being told by one doctor or another that they had "blood pressure." I rarely produce my

instruments now; practically one can tell by the finger on the pulse whether the pressure is high or not. The hard whipcord feeling of the renal pulse is characteristic, and also the arterio-sclerotic; but there is a large number of high pressure cases which are "benign," to quote a word used by Professor Lamb of Philadelphia in a letter to me about a patient of mine who had been under his care when she was on a visit to the United States.

A physician's aim in life is surely to diminish the sum total of human misery, mental as well as physical; and I think it is high time that we stowed away our sphygmomanometers and refrained from exciting panic in our patients' minds.—I am, etc.,

West Kirby, Aug. 3rd. ADAM MOSS.

## MEDICAL CONFIDENCES.

SIR,—The question of what is called medical secrecy is dealt with in a leading article in the JOURNAL of July 30th, p. 178, and I would like to put the matter in a rather different light.

This is not a question of medical privilege, it is fundamentally a question of medical honour, and it is this point that seems to be lost sight of.

It is essential for the benefit of the patient that what he confides to his doctor should be kept inviolate; it is upon this assumption that he confides in his doctor, and the relation between doctor and patient is based upon the trust of the patient in his doctor. It can never be right for that trust to be betrayed. The amount of pressure has nothing to do with it; no pressure, however great, can excuse a dishonourable action.

The penitent confesses to the priest for the saving of his soul: the patient confides in his doctor for the healing of his body. To my mind the trust is as sacred in the one case as the other. If the priest accepts and keeps inviolate the trust, the doctor can do no less. In the case of the confessional the problem was decided by the refusal of the priest to reveal in a court of law anything told to him in the confessional. There was no legal sanction for this, there is no legal sanction to-day, but the courts learned by experience that by no threat or compulsion could a priest be forced to reveal what he deemed himself bound in honour to conceal.

I suggest that in proposing to seek legislation on this point we are approaching the problem from the wrong direction: for one reason, legislation would probably not give us what we want; for another, as the problem has nothing to do with votes, Parliament would never find time for it.

The only way to ensure that our patients' confidences are not betrayed is to refuse to reveal them without the consent of the patient; that is to say, we must fight exactly as the Catholic Church fought. No judge should be able to compel a doctor to do a dishonourable act. It is a dishonourable act to betray a trust, and no words of any judge can make honourable that which is dishonourable. If a doctor is ordered to betray the trust of his patient he should refuse. It is possible or probable that he will be committed or fined for contempt of court: it is better to be so committed than to do a dishonourable action.—I am, etc.,

Brighton, Aug. 1st. ALAN C. GEMMELL.

## THE TUBERCULIN DISPENSARY BENEVOLENT SOCIETY.

SIR,—I should be grateful if you would enable me, through the medium of your columns, to bring to the notice of members of the profession the fact that the Tuberculin Dispensary is now carrying on its work at 32, Fitzroy Street, W.1. Patients may be sent for consultation and treatment on Tuesdays and Fridays at 2.30 p.m.

Medical men who are interested and would care to see the work for themselves are invited to attend; full facilities for seeing the patients and their records will be gladly afforded them.—I am, etc.,

W. CAMAC WILKINSON, M.D.

August 15th.

# Obituary.

THE LATE DR. C. W. DANIELS.—Dr. P. Manson-Bahr has sent us the following personal tribute to Dr. C. W. Daniels, of whom an obituary notice was published in our last issue (p. 287): By the death of Dr. C. W. Daniels yet another of the pioneers of tropical medicine has been lost to the cause. Daniels is to be considered as a pioneer, not so much by reason of outstanding research, but as guide, philosopher, and friend of the London School of Tropical Medicine in the days of its infancy. It is as a teacher with a peculiarly clear, perspicacious, yet practical mind that he will be remembered by his pupils, now to be numbered by their thousands. As a research worker Daniels will rank as a close colleague and fellow worker with Sir Patrick Manson, an association which led to the discovery of the adult forms of *Filaria ozzardi* and *F. demarquayi*; those elusive nematodes which, though isolated by his patient search, have never been "rediscovered" since his original specimens were procured in British Guiana in 1897. Daniels was not one who rushed into print, and his published works, *Laboratory Studies in Tropical Medicine* (with DR. H. B. Newham) and his *Tropical Medicine and Hygiene* (published first in 1909), both bear the imprint of long considered thought and practical experience. Daniels was a modest and retiring personality, and on this account probably was not generally estimated at his true worth; but he was a loyal, steadfast friend, full of true courage and sterling devotion, and never did he display these characteristics more fully than during the last eight years of suffering and gradual disablement from a most distressing malady.

DR. ALBERT DAVIES EDWARDS, who died on July 18th, at the age of 48, at his residence in Boscombe, received his medical education at University College, Cardiff, and the London Hospital. He graduated M.B., M.S.Lond. in 1906, and in the following year obtained the diploma D.P.H. After holding public health posts in East London, Cardiff, and Newport (Mon.), he was appointed assistant medical officer of health and school medical officer to Bournemouth in 1908, and medical officer of health two years later. Dr. Edwards held the special appointment of consulting medical officer of health to the Royal Victoria and West Hants Hospital. He was chairman of the Bournemouth Division of the Dorset and West Hants Branch of the British Medical Association from 1926 to 1927, and had been president of the Bournemouth Medical Society. A colleague writes: Dr. Edwards was not only an able administrator, but a keen clinician, and especially a diagnostician; he read much and formed his own conclusions, which were not always those most generally accepted. He was a good speaker, and always interesting. He was very fond of children, as is clearly shown in his book *Children of the Poor* (reviewed in the JOURNAL of August 28th, 1909, p. 554). His work as school medical officer and his charge of the Sanitary Hospital brought him much in contact with them and added to his happiness. In his life, however, there was much suffering, and for many years his sensitive nature had to struggle against the handicap of frequent pain. To this was added fear of the return of the malady which had entailed a very severe operation eleven years before his death. Anxiety with regard to his work was often present; thus the possibility of small-pox in the town going undetected was latterly a source of much worry, insomuch that he personally examined every case of chicken-pox notified during the last few years. This anxiety, coupled with increasing pain, led eventually to his death.

MR. FELIX COULSON VINRACE died at Birmingham on July 26th, at the age of 69. He was educated at King Edward's Grammar School and at Queen's College, Birmingham. He graduated M.D., M.Ch. in the National University of Ireland in 1881, and became F.R.C.S.Eng. in 1886. After holding various house appointments at the Queen's Hospital, Birmingham, and the Hospital for

Women, Soho Square, London, Mr. Vinrace settled in Birmingham, where his father had been a general practitioner; later he was appointed surgeon to the Birmingham and Midland Skin and Urinary Hospital. In 1897 he founded St. Paul's Hospital for Skin and Genito-Urinary Diseases in Endell Street, Holborn. His interest in this hospital, of which he remained senior surgeon until his death, was very great; and he made large contributions to its support. Mr. Vinrace was a prominent Freemason in Warwickshire. He was unmarried.

## The Services.

### ROYAL NAVAL MEDICAL SERVICE.

AN Order in Council, dated July 25th, has been issued (*London Gazette*, August 5th) directing that the number of specialist allowances shall be increased and paid at a higher rate, that the number of surgeon captains shall be increased, and certain other changes made.

*Specialist Allowances.*—The number of specialist allowances is to be increased from 46 to 60, and the subjects extended to include medicine, surgery, radiology, and hygiene, in addition to those specified in the Order in Council, June 28th, 1920. The rate of allowance is to be increased from 2s. 6d. to 5s. a day, and is to be paid also to surgeon commanders holding the appointment of naval health officer.

*Charge Pay.*—Medical officers in charge of hospitals and sick quarters are granted charge pay at the discretion of the Admiralty as follows: Surgeon rear admirals and surgeon captains 10s. a day, surgeon commanders 5s. a day.

*Establishment of Surgeon Captains.*—The number of surgeon captains is to be increased from 16 to 20.

*Previous Hospital Service.*—An officer who enters the service on or after July 1st, 1926, who has held for not less than one year a resident appointment as medical or surgical officer in a civil hospital recognized by the Admiralty, will be eligible to have his seniority ante-dated by not more than one year. This concession will not ordinarily be granted when the interval between the termination of the hospital appointment and date of entry into the service exceeds six months; a period of not more than six months spent in a non-resident appointment recognized by the Admiralty may count as part of the period of a resident appointment. The time concerned will reckon for increase of full, unemployed, and half-pay while on the active list, and retired pay or gratuity on retirement or withdrawal. A temporary officer, or an officer entered for short service, if transferred to the permanent list, may be granted the above concession, except that the time will not count for gratuity on retirement or withdrawal. The concession may also be extended to officers entered for short service who had transferred to the permanent list before July 1st, 1926. It will be limited, however, to such an ante-date of seniority as will preserve their position on the seniority list in relation to officers transferred on or after that date. Any increase in seniority thus granted will count for purposes of increments of full, half, and unemployed pay, and for promotion, but not for retired pay or gratuity.

### INDIAN MEDICAL SERVICE.

THE Secretary of State for India in Council on June 21st made the following amendment to the Superior Civil Services (Revision of Pay, Passage, and Pension) Rules, 1924—namely: In Schedule I to the said rules, at the end of the entry relating to the Indian Medical Service (Civil) the following shall be inserted—namely: "No officer employed as agency surgeon whose basic pay exceeds Rs.1,250 shall be entitled to draw the allowance authorized for proficiency in the Pashtu or Baluchi language." The said rules shall have effect, and shall be deemed always to have had effect, as if they had been enacted as so amended.

### TERRITORIAL DECORATION.

THE Territorial Decoration has been conferred upon the following officers of the R.A.M.C. (T.F.): Lieut-Colonel A. Johnstone Brown, Major H. Neville Burroughes, D.S.O.(ret.), and Major R. Ogier Ward, D.S.O., M.C.

### DEATHS IN THE SERVICES.

WE regret to have to record the death of Lieut.-Colonel Thomas Samuel Beauchamp Williams, I.M.S.(ret.). An inquest was held at Holborn on July 9th, when it was stated that he had been found a few days previously dead in his chambers in Cursitor Street, Chancery Lane. He was lying on the hearth, in his pyjamas, under a quilt, and near his head was a gas-ring with the tap turned on. A brother gave evidence that he was unmarried, that he had no financial worries, but had suffered from malaria and typhoid fever during the war, and had also had a sunstroke. A verdict of suicide while of unsound mind was returned. Lieut-Colonel Williams was a son of the late Venerable Thomas Williams, Archdeacon of Merioneth. He was born on May 5th, 1877, and was educated at Edinburgh, where he graduated M.B. and Ch.B. with honours in 1901. He entered the I.M.S. as lieutenant on January 29th, 1902; he received a brevet lieutenant-colonelcy for war services in June, 1917, became lieutenant-colonel by ordinary promotion in July, 1921, and retired, at the end of furlough in England, on March 7th, 1922. Most of his service previous to the war was spent in political employment under the Indian Foreign Department as agency surgeon in various native States, being for some years stationed at Bikanir, in Rajputana. He reverted to military duty after the war broke out, and served in Mesopotamia in 1916-18, being mentioned in dispatches in August, 1917, and being promoted, as above stated, to a brevet lieutenant-colonelcy. After his retirement he took up politics, and contested the Bridgwater Division of Somersetshire as a Labour candidate in 1922. On that occasion he received only 1,538 votes, as compared with 11,240 for the Conservative, and 11,121 for the Liberal. In 1924 he was returned for the Kennington Division of Lambeth, with 8,292 votes, the Conservative getting 7,782 and the Liberal 5,075; but in the election of the following year lost his seat in a straight fight, the Unionist getting 14,83 votes to his 11,572. In July, 1925, he stood for the Eastbourne division of Sussex, but received only 3,696 votes, the successful Unionist getting 12,741, and the Liberal 5,366. During the Parliament of 1923-24 he was parliamentary private secretary to Mr. Sidney Webb, President of the Board of Trade in the Labour Government. He was at one time member of the council of the Metropolitan Counties Branch of the British Medical Association, and had been a member of the executive committee of the Westminster and Holborn Division.

## Medical News.

THE Professional Classes Aid Council, the successor of the Professional Classes War Relief Council, continues to carry on its admirable work on behalf of the new poor and other professional men and women in distress. The British Medical Association is represented on the council by Mr. Bishop Harman. The report for the year ending April, 1927, states that 738 applications had been received, and financial help had been given to 163 families. Strong points are made of assisting in education and training. Assistance is also given to tide over periods of illness. The granting of loans has been found unsatisfactory; usually they merely add to a burden of debt which is never discharged. A special appeal, aided by the British Broadcasting Company, helped to place the finances of the council for the year in a satisfactory position, and the criticism formerly made that administrative expenses were somewhat high has been met by the explanation that the staff has necessarily to devote much time to social service.

THE Fellowship of Medicine announces that from August 29th to September 10th an all-day course will be provided at the Queen Mary's Hospital, Stratford, with instruction in medicine, surgery, and the specialties. At the Bethlem Royal Hospital there will be lecture-demonstrations twice a week, from September 6th till October 1st, and from September 12th to October 1st at the Royal Westminster Ophthalmic Hospital an afternoon course of clinical instruction, operations, and special demonstrations. The Queen's Hospital will hold an all-day course for the fortnight following September 12th. From September 19th to October 1st at the Royal National Orthopaedic Hospital there will be daily lecture-demonstrations, and a special visit will be paid to Brockley Hill Country Hospital on one Saturday. At the Westminster Hospital there will be a two weeks' course from September 19th to October 1st, including medicine, surgery, and the specialties, with facilities for visiting the mental institutions connected with the hospital. Copies of the syllabus of these courses and particulars of the general course of instruction provided at the associated hospitals may be obtained from the Secretary of the Fellowship, 1, Wimpole Street, W.1.

A THREE months' course of lectures and demonstrations on clinical practice and in hospital administration for the diploma in public health will be given at the North Eastern Hospital, St. Ann's Road, Tottenham, N.15, by the medical superintendent, Dr. F. H. Thomson, on Mondays and Wednesdays at 4.45 p.m., and alternate Saturdays at 11 a.m., commencing on Monday, October 3rd. The fee for the course, which complies with the requirements of the revised regulations of the General Medical Council, is £4 4s. A course under the old regulations may be taken for £3 3s.

THE medical members of the Council of the Chartered Society of Massage and Medical Gymnastics have issued a pamphlet addressed to the medical profession urging the employment in massage and physical treatment of persons entitled to attach the initials C.S.M.M.G. to their names. Such persons have been through a supervised course of training and have passed an examination of a high standard. The pamphlet gives a history of the "profession of massage" in this country from the formation of the Society of Trained Masseuses in 1894 to the present time, when over 5,500 masseurs and masseuses are registered with the Chartered Society. After commenting on the importance of physical measures in modern treatment, the medical signatories to the pamphlet declare that the members of the Chartered Society "constitute as widely spread and as well informed a body of masseuses and masseurs as can be found in any country in the civilized world."

THE annual summer school of the British Social Hygiene Council was held at Oxford at the beginning of August. The attendance included representatives of many interests—scholastic, religious, social, and service—from various parts of the empire, and their contributions added to the practical value of the discussions. Professor J. Arthur Thompson gave a series of five lectures on the biological aspects of modern sociological activities; Dr. Rees expounded the contributions of psychology to the problems of sex education; Mr. Z. F. Willis spoke on the problems of adolescence; and Mrs. Neville Rolfe on the elimination of venereal disease. Educationally and socially the gathering was considered a success, and it is hoped that in future years more medical men and educationists will attend.

LAST year legislative sanction was given in France to the regulation by by-laws of the *chambres d'allaitement*, or day nurseries; institutions have already been established for working women in many places. Their working has been described by Dr. G. Ichok, professor at the Ecole des Hautes Etudes Sociales, Paris, in the *Journal* of the Royal Sanitary Institute for July. It appears that these nurseries are either attached to the factories or established near them; mothers deposit their children in them while they are at work; and nursing mothers leave their work at stated intervals to suckle their infants. The by-laws prescribe the height and air space of the nursery, the lighting, temperature, and general cleanliness, and that a mother when she enters the nursery shall don a special blouse. The establishment is visited at least once a week by a doctor; his fees and the wages of the staff are paid by the owner of the factory; no contribution can be claimed from mothers. It is not quite clear whether it is compulsory on the employers to provide day nurseries, but their number has increased since the decree was promulgated.

THE report of the Lebanon Hospital for Mental Diseases at Asfuriyeh, near Beyrout, for the year ending March 31st, 1927, gives an interesting glimpse of the condition of mental treatment in Syria. The medical superintendent of the hospital, Professor H. Watson Smith, states that there was practically no treatment of the insane throughout the region between Constantinople and Cairo, except at Asfuriyeh, until the arrival of the British in Palestine, when a small Government hospital of 70 beds was started at Bethlehem. In Irak and numerous other places the insane were confined in prison, sometimes in chains. The Lebanon Mental Hospital was founded by a Swiss, the late Mr. T. Waldemeier, in 1896; since then 2,877 patients have received treatment in its wards. It has now 150 beds, and facilities for clinical study are provided for fourth year students and for post-graduates of the medical school of the American University at Beyrout; arrangements are made also for the holding of resident posts after qualification. The hospital is administered by a general committee in London, of which Dr. E. W. G. Masterman is chairman; there are also committees in Switzerland, Holland, and America. Copies of the annual report may be obtained from the general secretary, at the London office of the hospital, 139, Marylebone Road, N.W.1.

THE Permanent International Committee on Occupational Diseases has arranged that the fourth international session shall be held at Lyons in April, 1929. The subjects on which reports will be presented are silicosis, cataract of occupational origin, the endocrine system and forms of poisoning, and, if opportunity can be found, statistics of occupational diseases. Further information can be obtained from Professor Etienne Martin, of the Institute of Legal Medicine, Lyons, or from the Secretariat of the Committee, Hygiene Service, International Labour Office, Geneva.

THE fifth Congress of French-speaking Gynaecologists and Obstetricians will be held at Lyons, under the presidency of Professor Villard, from September 29th to October 1st. The questions to be discussed are the diagnosis and treatment of sterility of uterine and tubal origin, introduced by MM. Chatillon of Geneva and Douay of Paris, the indications for interruption of pregnancy, introduced by MM. Brouha of Liège and Bue of Lille, and the means of preventing separation of the mother from the newborn, introduced by M. Rhenter of Lyons. Further information can be obtained from Professor Voron, 12, Quai Tilsit, Lyons.

A SCHOOL of medicine and dentistry has recently been organized in the University of Rochester, New York, which, of course, must not be confused with the Mayo Clinic at Rochester, Minnesota. A description of the new school has been published by the Rockefeller Foundation in its seventh series of *Methods and Problems of Medical Education*. The school and hospital plans, the animal house, and the department of pathology are described by Dr. G. H. Whipple, the professor of pathology and dean of the medical school, who says that the two main principles constantly kept in mind during the organization of the medical school and the Strong Memorial (University) Hospital were the necessity for the closest physical contact between the clinics and the laboratories for the basic sciences, and the construction of a plant of the highest efficiency combined with extreme simplicity of structure and the strictest economy. The school and the university hospital are close to the new college for men undergraduates, and the municipal hospital has been connected by short corridors with the university hospital. In the department of anatomy neurology is combined with histology, and the latter taught very largely by the study of fresh tissues and experimental methods. Each member of the class is asked to prepare during the first year a paper on a subject chosen by himself. It is noteworthy that "lectures are given sparingly, about once a week. Attendance is, of course, voluntary." The dissecting rooms are open till 10 p.m. and the use of dissecting manuals is discouraged, the directions being given by word of mouth. Professor W. O. Fenn, in his account of the department of physiology, mentions that a generous share of the usual course on physiology is undertaken by the allied department of vital economics, the activities of which are described by the director, Professor J. R. Murlin, in an article with illustrations of the energy-metabolism laboratory. There is also a department of biochemistry and pharmacology of which Professor W. R. Bloor provides a detailed description. In his account of the pathological laboratories Professor Whipple mentions that they are open till 10 p.m. on every day in the year, and asserts that the mental attitude of the student is of vastly more importance than the accumulation of large numbers of facts. The department of bacteriology includes protozoology and some phases of helminthology, and so might, as Professor S. Bayne-Jones says, be more appropriately called that of medical microbiology. Professor W. S. McCann is adverse to the teaching of specialties as such in the medical curriculum, and therefore takes neurological and dermatological cases into the ordinary medical clinic. There is, however, a department of pediatrics under Professor S. W. Clausen, and also departments of surgery and of obstetrics and gynaecology.

A PROGRAMME of post-graduate courses in Berlin during the autumn has been issued, and may be obtained on application to the Office of the International Post-Graduate Courses, Kaiserin Friedrich-Haus, Luisenplatz 2–4, Berlin N.W.6.

# Letters, Notes, and Answers.

All communications in regard to editorial business should be addressed to ***The EDITOR, British Medical Journal, British Medical Association House, Tavistock Square, W.C.1.***

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the BRITISH MEDICAL JOURNAL alone unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the BRITISH MEDICAL JOURNAL must communicate with the Financial Secretary and Business Manager, British Medical Association House, Tavistock Square, W.C.1, on receipt of proofs.

All communications with reference to ADVERTISEMENTS, as well as orders for copies of the JOURNAL, should be addressed to the Financial Secretary and Business Manager.

The ***TELEPHONE NUMBERS*** of the British Medical Association and the BRITISH MEDICAL JOURNAL are *MUSEUM 9861, 9862, 9863,* and *9864* (internal exchange, four lines).

The ***TELEGRAPHIC ADDRESSES*** are:

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The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone: 4737 Dublin), and of the Scottish Office, 6, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh*; telephone: 4361 Central).

## QUERIES AND ANSWERS.

### ANGIO-NEUROTIC OEDEMA.

"AJAX" asks for hints on the treatment of angio-neurotic oedema. He has tried dietary and intestinal disinfection, among other measures.

### TREATMENT OF ONYCHIA.

WE have received two replies to the question of a correspondent about the treatment of onychia, published on July 30th. Dr. CHARLES HOLDWAY OSMOND (Bournemouth) recommends the following method: Soak the fingers in very hot water; then, with an orange stick (such as is used in manicure manipulation),

insert between the cuticle and the root of the nail a little ointment, consisting of equal parts of ammoniated mercury ointment, zinc ointment, and boric acid ointment. Dr. C. A. P. TRUMAN (Exeter) advises the use of an ointment consisting of equal parts of lead subnitrate and vaseline. Dr. Truman adds that the late Mr. Clinton Dent, from whom he heard of the treatment, said that the more acute the onychia the more certain the remedy, and Dr. Truman has found it not so efficacious in the slow creeping variety.

### INCOME TAX.

*Depreciation: Super Tax.*

"R. A. H." purchased, before the war, a new 12/18-h.p. car for £540. He was allowed 15 per cent. of that amount, £81, for depreciation for the financial year 1926-27, but the Special Commissioners propose to ignore that allowance in assessing him to super tax for 1927-28. A further income tax allowance of £69 has been made for 1927-28, and recently "R. A. H." has sold the car for £14, replacing it by a 14-h.p. car bought secondhand for £418. What should he claim in this connexion?

*** (1) Section 5 (2) of the Income Tax Act, 1918, provides that "where an assessment to income tax has become final and conclusive for the purposes of income tax for any year, the assessment shall also be final and conclusive . . . for the purposes of super tax for the following year." It appears to follow that the Special Commissioners should allow the £81 as for 1927-28. (2) A claim to obsolescence allowance should be made when the profits for 1927 are computed, and the amount treated as an expense of that year. The sum to be claimed is £540, less the allowances—£81+£69=£150, and also less the £14 received—that is, £540 less £164=£376.

*Depreciation of Car.*

A. B.—One partner claimed renewal allowance for an old car and the other depreciation allowance for a new car. The inspector of taxes refuses the latter claim if the former is granted.

*** It has been decided in the courts that where the expense of renewing machines, etc., is allowed the depreciation allowance is inadmissible. The Income Tax Acts deal with the profits of a firm as one unit, and we are of opinion that there is technical ground for the position taken up by the inspector. At the same time the result is inequitable—at any rate, as regards one partner—and it might be well to place the facts before the Secretary, Inland Revenue, Somerset House, W.C.1, with a request that in the special circumstances the inspector might be authorized to modify the demand.

*Three Years' Average.*

"M. F. G." bought A's practice in 1924 and B's practice in July, 1927. In the latter case he did not take over the house, nor an appointment worth £100 a year. Can he claim the three years' average and so obtain the benefit of the rising profits on A practice and of the deduction of the former expense of running the B practice?

*** The section which gives the option to the three years' average—Finance Act, 1926, Section 29 (3)—restricts it to persons who were in possession of the source of the income during, at any rate, some part of the six years preceding the three years forming the average for the year 1926-27. As "M. F. G." does not appear to have been in possession of either practice prior to April, 1924, he is not in a position to claim the three years' average.

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## LETTERS, NOTES, ETC.

### QUADRUPLETS.

REPORTS of two cases of quadruplets have recently been received. The first is from Dr. J. C. FOTHERINGHAM (Barry, Glamorganshire); the second is from Captain J. DUTT, M.B. (resident surgeon, Eden Hospital, Calcutta). Dr. Fotheringham quotes Hirst as giving the proportion of quadruplets as 1 in 371,126 births, and Captain Dutt quotes J. Clifton Edgar as giving it as 1 in 400,000.

*Case 1.*—On July 5th, 1926, I received a form from a R.N.D. midwife to attend Mrs. H., aged 28, a multipara. On arrival I found that the midwife had delivered the patient of four children, one male and three female, all living. The placenta was expelled without difficulty and a hypodermic injection of 1 c.cm. of pituitrin was given. The children were rubbed over with warm olive oil and wrapped in cotton-wool. The patient was up and about on the tenth day. Shortly afterwards she was again pregnant, and recently I delivered her of a male child weighing 12 lb. The quadruplets were perfectly normal and averaged 3¼ lb. They were artificially fed, but, after surviving one month, all died within a few days. There is a history of multiple pregnancies in the families of both parents.

*Case 2.*—A Hindu lady, aged 25, was admitted into the Eden Hospital, Calcutta, on May 28th, 1927, for persistent vomiting and rapid loss of weight; amenorrhoea had been present for four months. She had had two children, the younger being 3 years old. The previous pregnancies were normal. She was extremely emaciated. The fundus of the uterus reached to the level of the umbilicus; the foetal parts and movements could be felt, but no foetal heart sounds could be heard. The urine showed a trace of albumin and marked acetone. She was kept under observation for a week, but her condition grew worse and induction was considered absolutely necessary. The slow method by tents was adopted. On the third day pains started and four foetuses and two placentae were expelled without any complication. Three of the foetuses were male, with one common placenta; the fourth was female and had a separate placenta. The female foetus, with its placenta, and one of the male foetuses were macerated. The weights of the male foetuses were 2, 2½, and 3½ oz., and their average length was 6 inches. The weight of the female foetus was 1½ oz., and it measured 5 inches. The placentae weighed 5 oz. and 3 oz. respectively. After delivery the patient had fever for four or five days, but she improved rapidly and left the hospital on the eleventh day. I am grateful to Lieut.-Colonel V. B. Green-Armytage, M.D., F.R.C.P.Lond., Surgeon-Superintendent of the Eden Hospital, for allowing me to publish this case.

### THE ESSENTIAL OIL TREATMENT OF CHOLERA.

DR. JOHN W. TOMB (Mines Board of Health, Asansol, Bengal) has sent us a very long reply to the letter from Lieut.-Colonel G. O. F. Sealy, I.M.S., published in our issue of May 28th (p. 985). Dr. Tomb states that he has never claimed to be the originator of the use of the essential oils in the treatment of cholera. The prescription, known as "cholera drops," belonged to the medical department of the East Indian Railway; Dr. Tomb became acquainted with it while serving as medical officer to the company, and subsequently obtained the exact formula from the then acting medical officer. A similar prescription, as he afterwards learnt, was formerly in use throughout India under the name of "Mist. pro diarrhoea"; it contained the oils of aniseed, juniper, and cajuput, with alcohol and ether acidified with 1 per cent. sulphuric acid. Dr. Tomb modified this prescription slightly by substituting oil of cloves for oil of aniseed. The only credit claimed by Dr. Tomb in the matter was that he showed how the mixture could be successfully used on a large scale in the mining settlement, both as a remedy and as a preventive. The incidence of cholera in the settlement was reduced to less than 1 per 1,000, which was wholly at variance with all previous experience. Apparently it had been the custom to give the mixture in drops; Dr. Tomb's plan was to administer 1 drachm every half-hour until 1 oz. had been given, followed by 1 drachm every hour until recovery; and as a preventive he gave 1 drachm in water twice or thrice daily. With regard to the correspondence referred to by Lieut.-Colonel Sealy, it consisted of the single question whether the 40-minim doses of the mixture mentioned by him were given in water, and his reply that he gave the oils and the pro-diarrhoea mixture in half a teaspoonful of sugar.

DR. N. N. MEHTA, of Dadar, Bombay, writing with reference to the employment of the essential oils in cases of cholera and other forms of severe diarrhoea, states that an indigenous medicine named amritdhara is in great repute in the treatment of these affections, and that it contains camphor, thymol, menthol, cardamom, and cinnamon. He has found that equally good results can be obtained with the first three of these drugs, given in equal quantities, and mentions a number of cases in which they have been employed with the greatest benefit. His plan is to administer 8 or 10 minims in a gelatine capsule every two hours until the diarrhoea is checked, the interval being then increased to four hours, the diet throughout being restricted to barley water. If the patient will permit it, he also administers an intramuscular injection of 5 or 10 minims of a solution of camphor in ether. Treatment with salines should not, he considers, be resorted to in the early stages, but with the onset of symptoms of collapse they can with advantage be added to the treatment with essential oils.

### DEATH CERTIFICATION.

DR. SIDNEY MATTHEWS (Crawley, Sussex) writes: I am not certain for whose benefit the amended Births and Deaths Registration Act has been passed, so far as the new method of death certification is concerned. During the forty years I have been in practice I have handed the certificates to the relatives of the deceased and the matter ended. I have never had any trouble. On July 30th a patient died. I followed out the new details. On August 1st the relatives arrived to say that they had been seven miles to the registrar and no certificate had arrived. The funeral was fixed for the next day. I was compelled, for the first time in my life, to give a duplicate certificate, and the friends repeated the seven miles journey. The local postmaster could only suppose that the original letter "had got caught up in a newspaper, as had happened before." I would suggest that the envelopes issued by the local registrars should be marked "registered," to avoid a future extremely unpleasant situation.

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### VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 34, 35, 38, and 39 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 36 and 37.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 120.